STEEL
The Metalworking Weekly
A PENTON PUBLICATION

JANUARY 9, 1961

THE RACINE STORY—

JAMES RIZZO, Secretary, Local 553, United Auto Workers

ARNOLD O. WOLF
President, Hamilton Beach Co.

JOHN H. BATTEN
President, Twin Disc Clutch Co.

The Fight for Better Business Climate, 37

'61 Equipment Outlays to Hold High . . 27
New Press Forges the 'Impossible' . . 60
Columbium Hailed as a Comer 91

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NUMERICAL CONTROL...

A Realistic Appraisal

by A. Francis Townsend
Vice President, Engineering
The Heald Machine Company

At the 1960 Machine Tool Exposition, numerical control emerged as the shining new star on the metalworking horizon. In fact, if you didn't have something numerically controlled to demonstrate, you just weren't in the running.

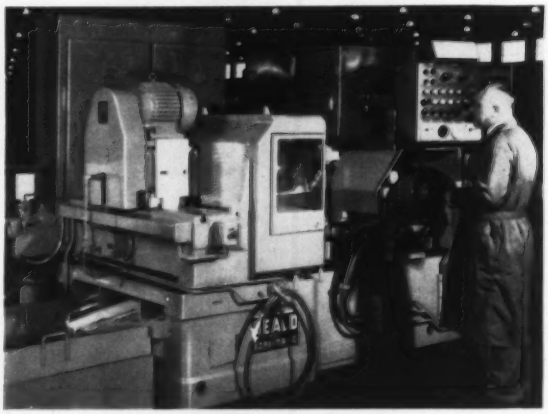
This subject is one that deserves a realistic appraisal. Is it a "fad" that will not stand the test of time? Or is it a panacea, a cure-all, that will eventually make all manually-operated machines obsolete?

Since Heald offers both numerically controlled and manually operated machines, we can afford to look at the subject objectively. Of this we can be sure—numerical control is here to *stay*. On the other hand, we can be equally sure that it is not the universal solution to all machining problems —and that manual operation will also be around for a long time to come.

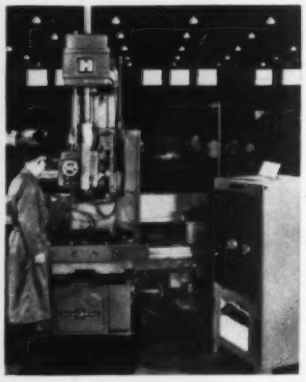
Where to use numerical control is largely a matter of production economics. How far it can be *profitably applied* depends on many factors, including the nature of the workpiece and the operations to be performed. In general, however, numerical control will usually be most advantageous where any of the following conditions are encountered.

1. Where several different setups are required on the same or different workpieces.
2. Where the operations performed are complex in nature.
3. Where manual setup time is relatively high.
4. Where time for tooling design, manufacture and use must be reduced.
5. Where variety and complexity of work require excessive tooling cost.

Properly applied, numerical control offers many profitable opportunities for making substantial cost reductions. Improperly applied, it will be a disappointing investment.



Numerically-controlled Bore-Matics permit contour boring and turning of irregular shapes with higher accuracy and precision than were heretofore obtainable. In routine production, the machine shown here contour turns an aluminum workpiece to ± .0001" of true path.

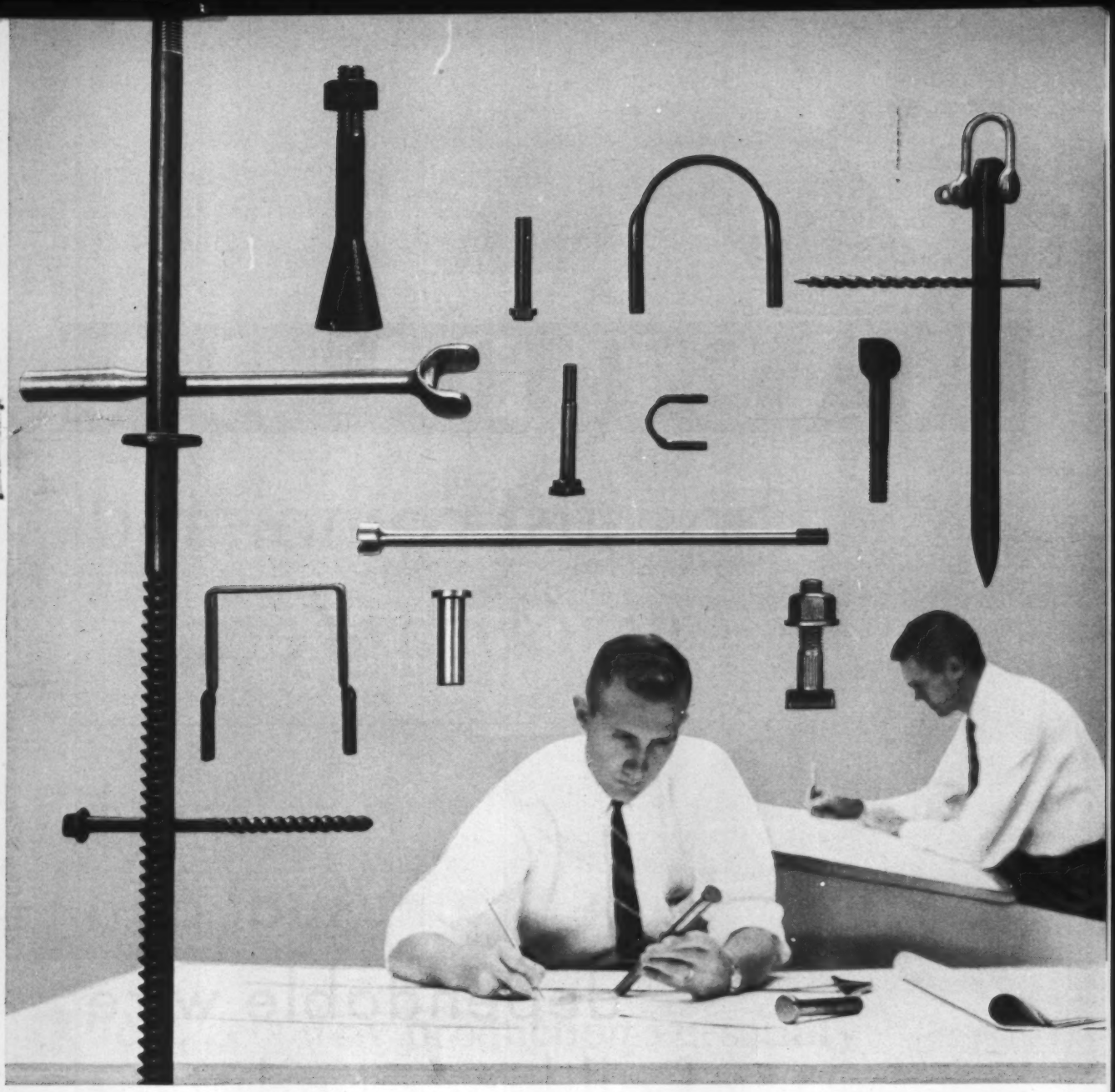


Numerically-controlled HEALDRILL makes high-precision layout or production drilling **fully automatic** —with tape control of precise hole location as well as selection of speeds, feed rates and tool change indication. A taped program for any workpiece can be stored and reused whenever needed for exact duplication of the most complex drilling operations.

Your Heald engineer is fully qualified to help you evaluate the economics of numerical control for Borizing, grinding and precision drilling operations. It will pay you to call him in before taking the "plunge."

THE HEALD MACHINE COMPANY

Subsidiary of The Cincinnati Milling Machine Co.
Worcester 6, Massachusetts



Bethlehem makes "specials" to your specification.

And we often cut costs by redesigning to improve the product.

Every one of these specialty products was made for a specific application from drawings or specifications supplied by our customer. Translating your design into a finished part is seldom easy. But if the job can be done . . . Bethlehem fastener engineers can do it.

Let us know what you need. Our fastener engineers will study your requirements and give you an honest answer on what we can do. For more information call the nearest Bethlehem sales office. Or write to us at Bethlehem, Pa.

Steel

for Strength
... Economy
... Versatility

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA. Export Sales: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

WASHBURN

has just completed its 60th Year

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CLEAN, UNIFORM BILLETS – STRIP – RECTANGULAR, ROUND, FLAT RODS

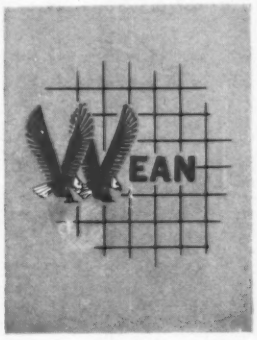
TEMPERED AND UNTEMPERED FLAT AND ROUND HIGH CARBON WIRES

J&L gets new production versatility with two rugged Wean Shearing Lines

Jones & Laughlin Steel Corporation's Cleveland Works Division has added these modern Wean shearing lines to satisfy an increasingly wide range of customer requirements. Both lines can handle 30,000# coils up to 75" wide. The Upcut Shear Line (left) can side-trim and shear strip up to ⅜" thick, with cut-lengths varying from 48" to 500", at a maximum speed of 140 fpm.

The combination Flying Shear Line (right) shears strip up to ¼" in thickness, with maximum cut lengths of 288", at speeds up to 350 fpm. This high-speed Wean line also permits combinations of side-trimming, slitting, temper passing and shearing or recoiling operations.

If you are planning expansion or modernization of your hot rolled strip shearing facilities, a Wean representative will welcome the opportunity to discuss your requirements. Wean's *creative engineering* can mean new profits for you.



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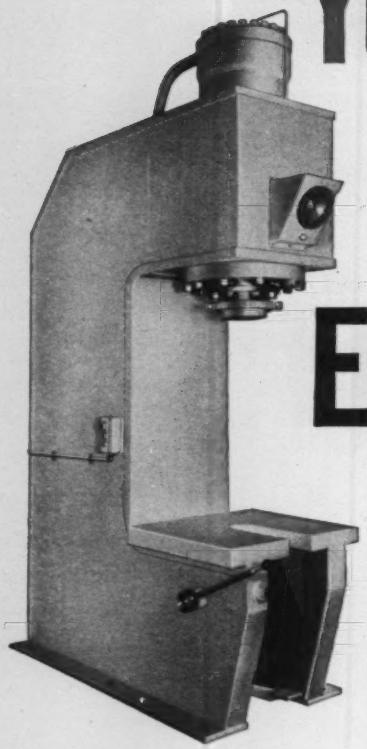
You specify the shapes...



ERIE WILL BUILD THE PRESS

When you have unusually shaped parts to position for assembling, forming, forcing, straightening and similar operations, an Erie C-frame hydraulic press may be the all-purpose machine you need. Open on three sides, the C-frame design provides maximum accessibility to the work area. It eliminates the restrictive caging normally caused by support rods or frame castings.

Custom-designed Erie C-frame hydraulic presses can be manufactured to meet unusual requirements. Both horizontal and vertical frame machines have been built for high-speed production in capacities to 500 tons.

Standard Erie C-frame hydraulic presses are also available in a range of sizes, with capacities up to 250 tons.

Erie C-frame hydraulic presses have all steel welded frames to assure a high safety factor with minimum deflection. Power units are built in. Sensitive controls include dual hand and foot levers to provide accurate operation in either direction.

For the complete story, phone or write Mr. Carl Hammon, Erie Foundry Company, Erie 1, Pa. Ask for Bulletin 370.

ERIE

ERIE FOUNDRY COMPANY

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EF-60-04

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We Carry on in 1961

The gallop expected in our economy for the 1960s has been closer to a limp thus far. Why? What can be done? STEEL will try to answer both those questions in its 1961 Program for Management which starts Jan. 16 with the first of 25 installments. (They will appear every other week throughout the year.)

The theme will be Plan for Profit Growth. It will show you the seriousness of profit shrinkage, and it will reveal the potentials that lie before you if the problem is solved. Associate Managing Editor John Morgan and Associate Editor George Howick are in charge of the project.

Our Program for Management enters its ninth year in 1961. We started on Feb. 23, 1953, with an article on "How Industry Can Be a Better Neighbor." Since then, we have published 96 installments in the program, have received five Industrial Marketing awards for the series, have been swamped with more than 20,000 letters regarding the articles, and have sent some 630,000 reprints to interested readers.

Who's Who

As we announced last week, the masthead has been moved to Page 6. Besides the comfort Ed Service derives from having all those people behind him, the location makes it convenient for you to check the whereabouts of our staffers. For example, Reed Trask, formerly of our Cleveland office, is now a resident editor in New York.

Chain Reaction

Peter Falconer, works manager, Twin Disc Clutch Co., Racine, Wis., read and liked our Sept. 5 ("Fight for Survival") issue. That act set off a chain reaction that culminated in his becoming STEEL's Honorary Editor No. 15. Here's what happened:

He gave a copy to George Rogers of American Free Enterprise Productions, Morton Grove, Ill., who was preparing an employee education and communication program for Twin Disc. Mr. Rogers agreed with Mr. Falconer's opinion that the issue contained good data for use in the program. Mr. Rogers then came to Cleveland, and obtained our permission to use the material. While here, he told Machine Tool Editor Bob Huber and Associate Editor George Howick about efforts by Racine citizens to improve their community as a place for industry to locate. George trekked to the Belle City and got the story which you'll find in this issue.

George also obtained material on the Twin Disc program that appeared in our Jan. 2 Yearbook.

There's a Little Time Left . . .

. . . to enter STEEL's Usership Idea of the Month Contest. Deadline for the final contest (December) is Feb. 1, 1961. For rules, see the Servicenter, Pages 5 and 6 in any December issue. You might win $1000.

An Editorial's Appeal Endureth

And, lo, there came into the offices of STEEL, a deluge of mail, a veritable flood, all in praise of the words written by the magazine's editor, Walt Campbell.

Editor Campbell composed the words for the editorial, "Parable of the Prices," in July, 1957. It entered our reprint record book as the "best seller" in the history of STEEL. Many readers suggested that it would be even more timely in 1960. At their request, the editorial was republished in our Dec. 5, 1960, issue.

Excerpts

Stuart H. Smith, vice president in charge of sales, SKF Industries Inc., Philadelphia, said: "I would appreciate 100 reprints . . . (for) our field (selling) organization."

R. C. Nickles, president, Nickles Machine Corp., Ponca City, Okla., ordered 7000 copies for customers and a like number of the Nov. 14 editorial, "Mr. Kennedy," for the same use.

G. A. Duemling, assistant executive vice president, Winslow Engineering & Mfg. Co., Oakland, Calif., and C. W. Pilkey, advertising manager, Alloy Rods Co., York, Pa., received permission to reproduce the "Parable" as certificates, suitable for framing, for the benefit of their distributors around the country.

STEEL, the metalworking weekly, is selectively distributed without charge to qualified management personnel with administrative, production, engineering, or purchasing functions in U. S. metalworking plants employing 20 or more. Those unable to qualify, or those wishing home delivered copies, may purchase copies at these rates: U. S. and possessions and Canada, $10 a year; all other countries, $30 a year; single copies, 50 cents. Metalworking Yearbook issue, $2. Published every Monday by The Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio. Accepted as controlled circulation publication at Cleveland, Ohio.

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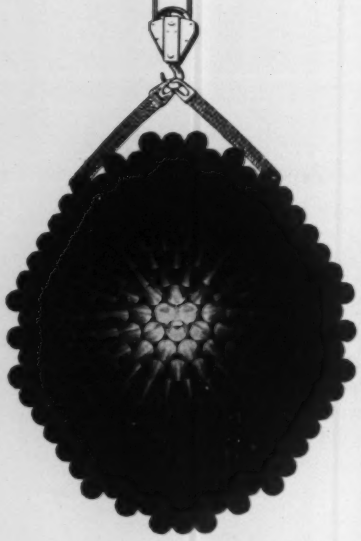

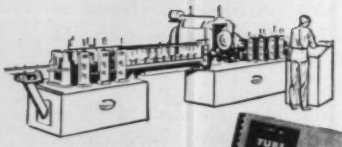

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Fluid Power NEWS

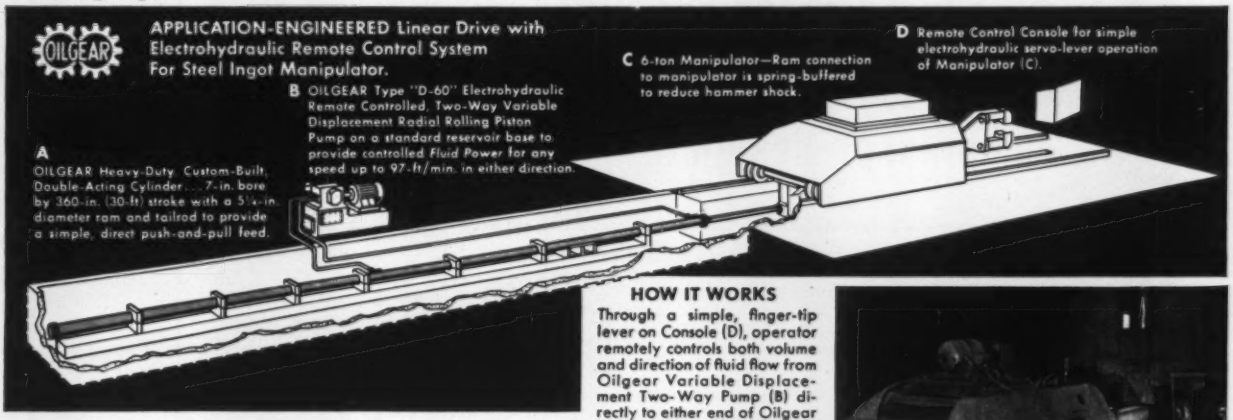
REPORT NO. 11,801 REMOTE CONTROLLED INGOT MANIPULATOR

From Oilgear *Application-Engineering* Files

HOW OILGEAR DRIVE SYSTEM ON INGOT MANIPULATOR IMPROVES CONTROL—CUTS DOWNTIME

DATA: Replace an electric variable speed drive on a 6-ton ingot manipulator because of excessive maintenance downtime, high rebuilding and replacement costs. Initial replacement plans called for a hydraulic variable speed drive directly to manipulator wheels, retaining customary practice of operators riding on manipulator. A job study revealed that while feeding an ingot under the open frame steam hammer, forward motion is momentarily stopped by each hammer impact—frequently bouncing manipulator wheels in the air, causing traction, speed control, shock, and operator fatigue problems.

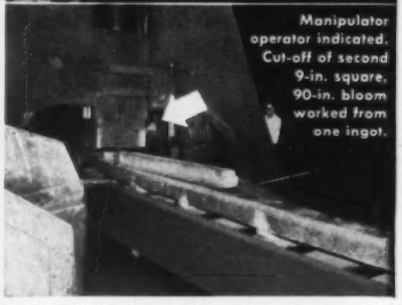
Basic Manipulator Drive Requirements were re-evaluated as follows: 1. Remove drive from manipulator to reduce shock-provoked maintenance downtime. 2. Drive to be independent of wheel traction to improve feed and control. 3. Provide stepless, remote speed control from zero to maximum in both directions. 4. Withstand severe shock, vibration, heat, and dust on a continuous 16-hour day basis. 5. Reduce operating, maintenance, and installation costs. 6. Provide for future incorporation of hammer control with remote manipulator console.


OILGEAR
APPLICATION-ENGINEERED Linear Drive with Electrohydraulic Remote Control System For Steel Ingot Manipulator.
A OILGEAR Heavy-Duty, Custom-Built, Double-Acting Cylinder . . . 7-in. bore by 360-in. (30-ft) stroke with a 5¼-in. diameter ram and tailrod to provide a simple, direct push-and-pull feed.
B OILGEAR Type "D-60" Electrohydraulic Remote Controlled, Two-Way Variable Displacement Radial Rolling Piston Pump on a standard reservoir base to provide controlled Fluid Power for any speed up to 97-ft/min. in either direction.
C 6-ton Manipulator—Ram connection to manipulator is spring-buffered to reduce hammer shock.
D Remote Control Console for simple electrohydraulic servo-lever operation of Manipulator (C).

HOW IT WORKS

Through a simple, finger-tip lever on Console (D), operator remotely controls both volume and direction of fluid flow from Oilgear Variable Displacement Two-Way Pump (B) directly to either end of Oilgear Custom Cylinder (A). Only two pipe lines are required. Power input is used only in proportion to work performed, as no pump output power is wasted in direction control valves, external relief valves, flow control valves, auxiliary components, or excessive piping. Stepless, infinitely variable, smooth, steady manipulator speeds are instantly available in either direction. Fluid flow and pressure decelerate to zero as flow direction is changed—flow and pressure then accelerate to any selected amount in the new direction . . . reversal is smooth-cushioned — shock is eliminated. Controlled acceleration and deceleration; hydrodynamic braking; automatic pressure and flood lubrication; continuous filtration of power fluid . . . all are inherent features of Oilgear "Any-Speed" Drive Systems.

Hammer operator indicated Oilgear-powered Manipulator with 5300-lb ingot.


Manipulator operator indicated. Cut-off of second 9-in. square, 90-in. bloom worked from one ingot.

SOLUTION: An Oilgear Linear Drive and Electrohydraulic Control System as shown above schematically. This departure from customary manipulator drives has proved—*in over two years of operation*—to have the following advantages: 1. Lower operating costs . . . previous manipulator averaged 12% to 15% downtime every 16-hour day for repair and adjustment of drive and control components. 2. Direct push and pull linear drive is a more positive, smoother, shockless feed—NOT affected by variations in wheel traction. 3. Remote console with simple electrohydraulic servo control eliminates operator discomfort and fatigue. 4. Cylinder is protected below floor—"Power-Pak" is mounted away from heat and dust of work area. 5. Constant, automatic overload protection insures longer life, prevents damage.

System was selected due to Oilgear's reputation for trouble-free reliability, long life, simplicity, and on-the-job-proved performance of the following *Oilgear-Powered* equipment in this user's plants . . . 300-ton ingot strippers . . . large forming presses . . . tube pointing presses . . . hydrostatic testers . . . stripping presses . . . pipe benders . . . seamless steel tube piercers . . . planers . . . cut-off machines . . . tube threaders—operating efficiently—in constant, daily use—some have been in service for more than 20 years.

User Reports—" . . . well pleased with the steady feed rate at both low and high speeds . . . we'll go to this type of drive when we rebuild or require another Manipulator."

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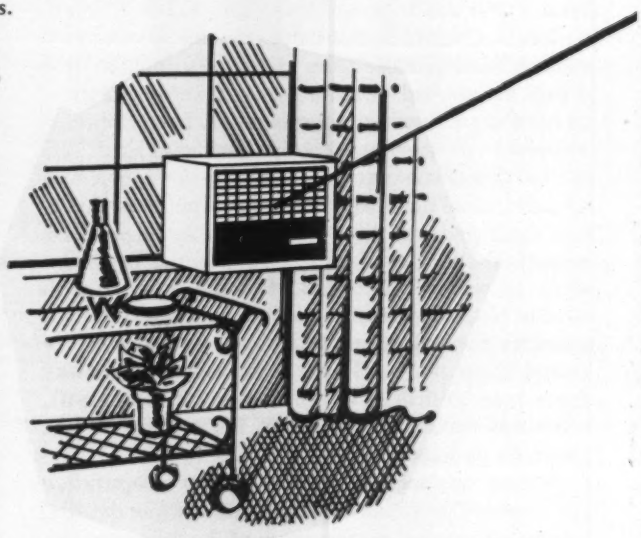
this GRAMIX part is a new concept in powder metallurgy techniques . . . engineered to meet requirements of GENERAL ELECTRIC'S new compressor design

This large, complex shaped compressor body which is employed in air conditioners manufactured by General Electric is an outstanding example of a GRAMIX part engineered and produced to exacting specifications. As in all GRAMIX products of powder metallurgy, the alloy was created to meet exacting physical properties required in this particular application. Correct briquetting, controlled sintering procedures, precise finishing operations and rigid quality control throughout the manufacturing process assures General Electric uniform, dependable GRAMIX parts. The production of this body as a product of powder metallurgy has also enabled General Electric to effect important design changes in their air conditioning units.

GRAMIX engineers have the experience, the techniques and the equipment to produce top quality products of powder metallurgy. No matter what type of part you need, no matter what characteristics that part must possess, it will pay you to select GRAMIX . . . and get both "job-engineered" alloys and quality-controlled production to meet each specific operating requirement.

◀ Write today for these helpful engineering manuals. No. 18 covers design and metallurgical requirements and alloy selection of GRAMIX bearings. No. 19 covers GRAMIX Machine Parts and No. 21 contains general information on GRAMIX products from Powder Metallurgy.



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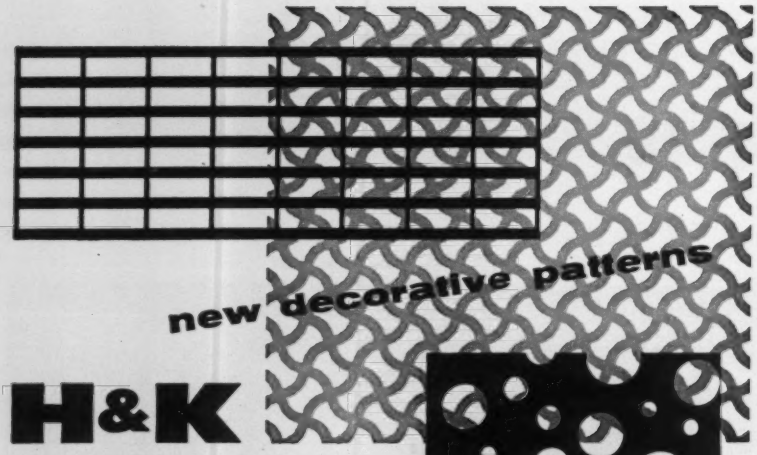
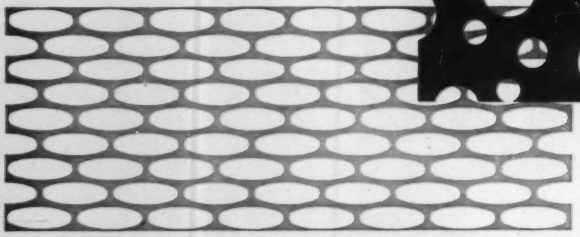


H&K
perforated materials

Passage or control of air, sound, light or fluid . . . decorative concealment . . . component protection . . . eye catching, sales-building beauty—if your product requires any or *all* of these features, you'll find the design and functional versatility you need in the Harrington & King line of perforated materials. Just four of H & K's new patterns are illustrated here. There are many more contemporary and traditional designs, all available in steel sheets for shipment from stock.

And there is also a vast selection of additional patterns and open areas which can be custom fabricated from existing dies. H & K can perforate practically any material. May we put our more than 75 years of experience to work for you?



Listed Under "Perforated Metals"

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New York Office & Warehouse
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Please send me: ☐ GENERAL CATALOG No. 75
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STREET_____

CITY_____ ZONE____ STATE_____

CALENDAR
OF MEETINGS

Jan. 17-19, Instrument Society of America: Winter instrument-automation conference & exhibit, Sheraton-Jefferson Hotel and Kiel Auditorium, St. Louis. Society's address: 313 Sixth Ave., Pittsburgh 22, Pa. Executive director: William H. Kushnick.

Jan. 18, The Metallurgical Society of AIME: Third AIME mechanical working conference, Penn-Sheraton Hotel, Pittsburgh. Society's address: 20 W. 39th St., New York 18, N. Y. Secretary: R. W. Shearman.

Jan. 18, Steel Plate Fabricators Association: Annual meeting, Lago Mar Hotel, Ft. Lauderdale, Fla. Association's address: 195 W. Madison St., Chicago 2, Ill. Secretary: J. Dwight Evans.

Jan. 19, Engineers Joint Council: Annual meeting, Biltmore Hotel, New York. Council's address: 29 W. 39th St., New York 18, N. Y. Secretary: L. K. Wheelock.

Jan. 19-21, Southern Industrial Distributors Association: Mid-year meeting, Palm Beach Biltmore Hotel, Palm Beach, Fla. Association's address: 1626 Fulton Bank Bldg., Atlanta 3, Ga. Secretary-treasurer: E. L. Pugh.

Jan. 23-24, Industrial Heating Equipment Association Inc.: Winter meeting, Dearborn Inn, Dearborn, Mich. Association's address: Association Bldg., Washington 6, D. C. Executive vice president: Robert E. Fleming.

Jan. 23-26, Plant Maintenance Show: International Amphitheatre, Chicago. Information: Clapp & Poliak Inc., 341 Madison Ave., New York 17, N. Y.

Jan. 30-Feb. 3, American Society for Testing Materials: Committee week, Netherland-Hilton, Cincinnati. Society's address: 1916 Race St., Philadelphia 3, Pa. Executive secretary: Thomas A. Marshall Jr.

Jan. 31, Steel Kitchen Cabinet Manufacturers Association: Annual meeting, Sheraton Towers Hotel, Chicago. Association's address: 910 Park Bldg., Cleveland 14, Ohio. Executive sectary: Sanford Curtiss.

Feb. 5-9, Associated Equipment Distributors: Annual convention and exhibit, Biltmore and Statler Hotels, Los Angeles. Distributor's address: 30 E. Cedar St., Chicago 11, Ill. Executive secretary: P. D. Hermann.

Feb. 10-12, American Electroplaters Society: Interim meeting, Statler-Hilton Hotel, Hartford, Conn. Society's address: 445 Broad St., Newark 2, N. J. Executive secretary: John P. Nichols.

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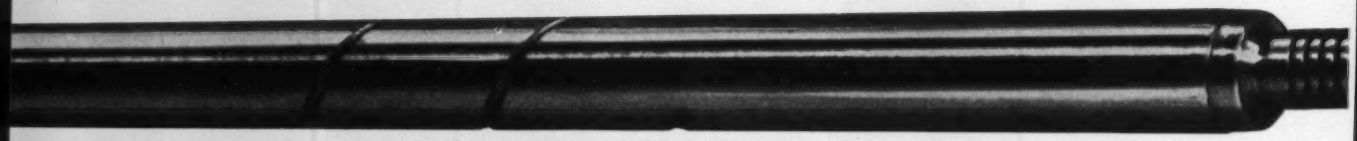
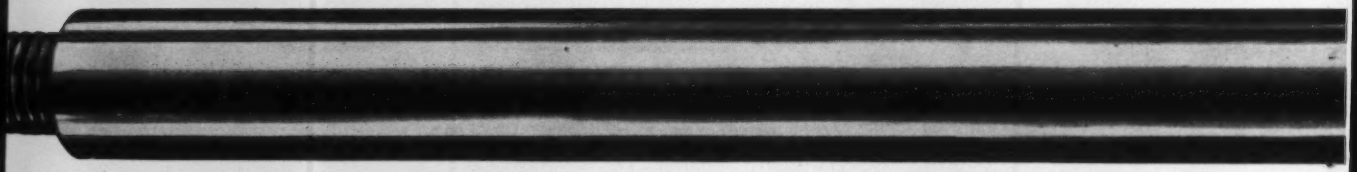
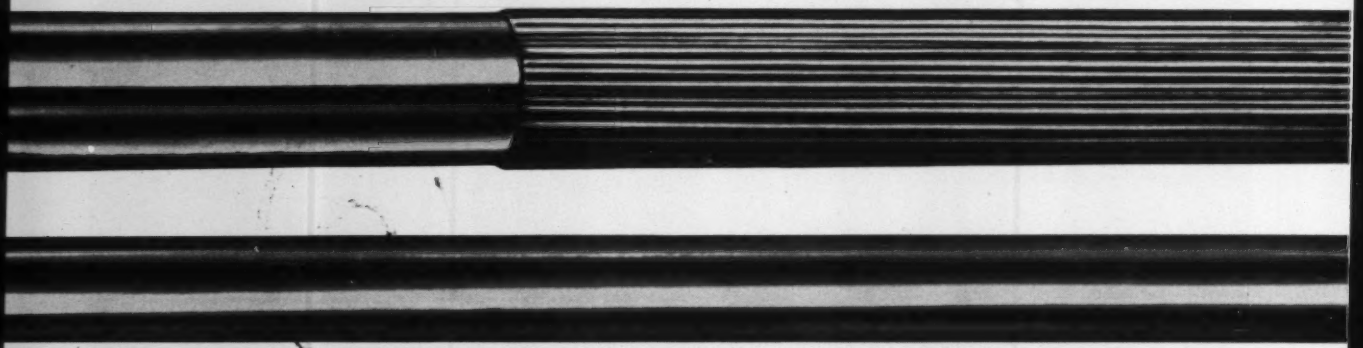


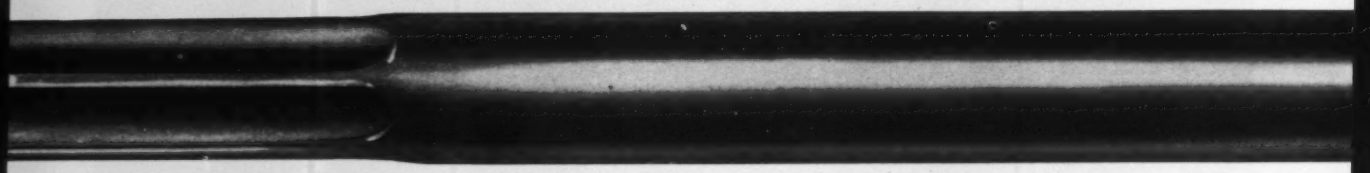
CENTURY SERIES C-1144 for highly machined parts.

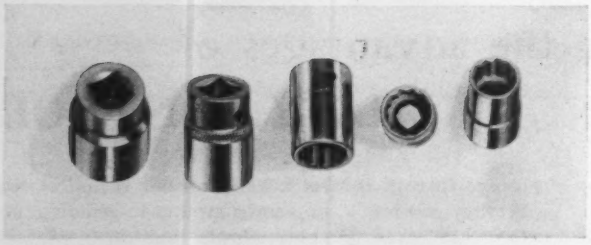


CENTURY SERIES C-1141 and C-1151 for moderately machined parts.



CENTURY SERIES C-1050 and C-1045 for parts where machinability is a minor factor.





WRENCH SOCKETS, made by Herbrand Division of The Bingham-Herbrand Corporation, Fremont, Ohio, illustrate the kind of application where the superior strength, toughness, and machinability of *Republic Cold Finished Alloy Bars* help produce a better product at lower cost.

Bars are formed, drilled, and cut off in an automatic screw machine, then hot broached to shape internal dimensions. Final stages of socket production include heat treat and chrome plating. Mail coupon for more data on Republic Alloy Bars.

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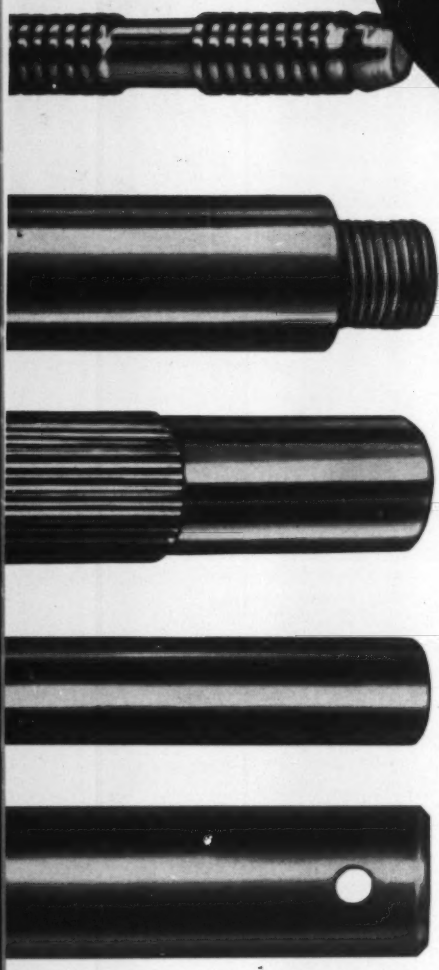

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LET YOU CHOOSE FROM 5 GRADES, 5 DEGREES OF MACHINABILITY, 5 PRICE LEVELS

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PRODUCTION FACILITIES for CENTURY SERIES bars are strategically located in key metalworking markets to serve you better. Result: faster deliveries, and expert metallurgical service, *when you need it,* on the complete line of Republic Cold Finished Steel Bars. For more information on CENTURY SERIES bars and Republic Metallurgical Services, send the attached coupon.

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Lights, camera, action

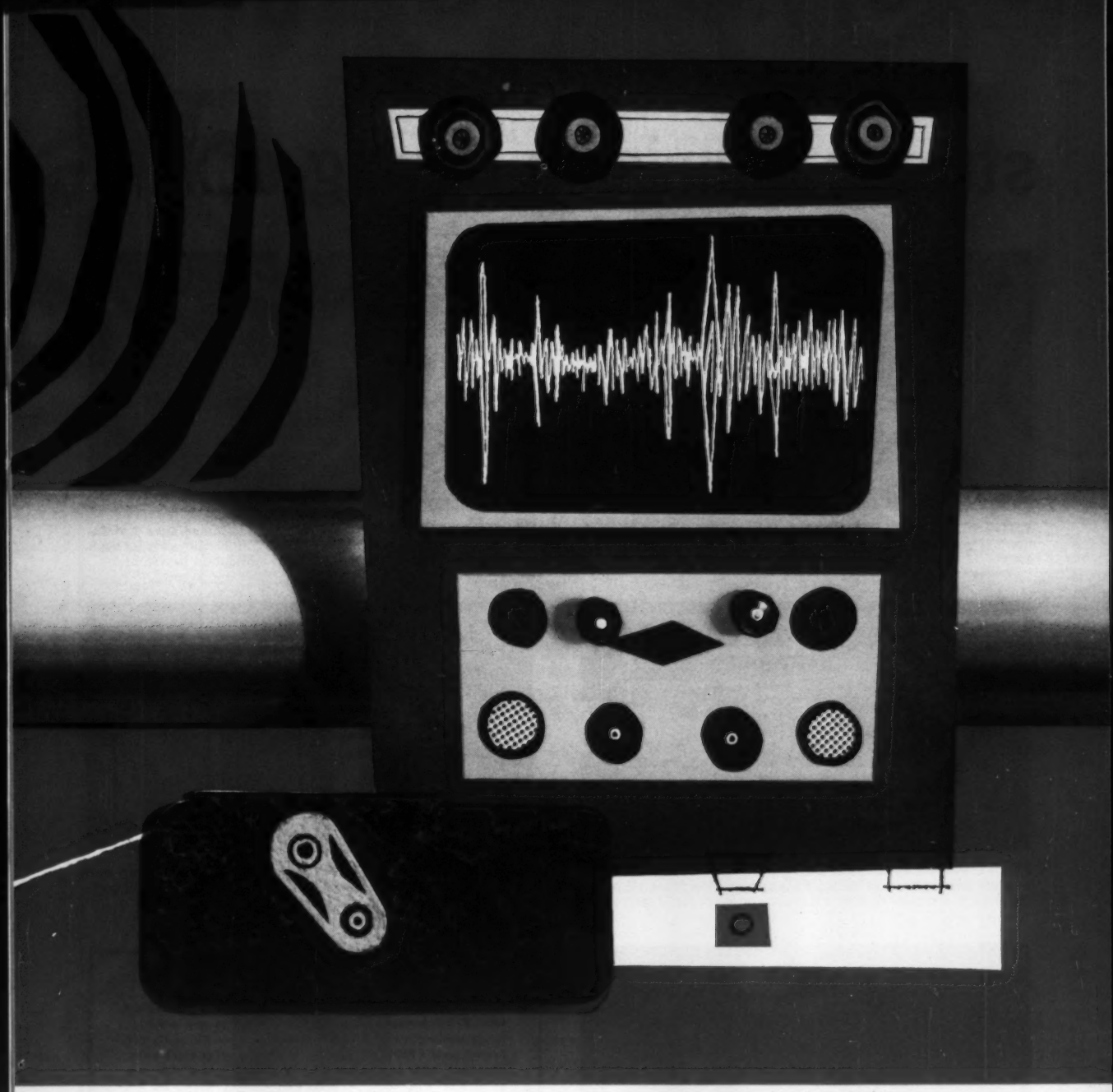
National Tube tests USS National Electric-Resistance Welded Pressure Tubing with sound waves. This ultrasonic weld inspection process is tougher than a Hollywood screen test.

This mark tells you a product is made of modern Steel.

As the tubing slides directly over a ground quartz crystal, electrical pulses are focused on the weld area. The crystal changes these pulses into ultrasonic vibrations which bounce off the weld and reflect its strength or weakness. The vibrations are speared by the crystal, converted back into electrical energy, and floated across an oscilloscope screen.

If a bad weld is reflected, the electrical current dances wildly on the screen and triggers an alarm system. The crooked pattern is pen-recorded on a graph, a bullfrog-voiced horn croaks loudly, and the tubing is squirted with black paint to mark the defect.

In case the ultrasonic unit breaks down, a red-faced dome



light automatically flashes, revolves and winks at the weld inspector. This blushing signal tells him that the unit needs to be repaired. It's added insurance that every length of tubing is completely tested before it leaves the plant.

Our inspection techniques are rigid. But they help us develop a high quality product for use in applications such as boilers, heat exchangers, condensers, superheaters, economizers and other types of heat transfer equipment. Consider USS National Electric-Welded Tubing for your next installation. Our trained Mill Service Force is available for field consultation. Write National Tube Division, United States Steel, 525 William Penn Place, Pittsburgh 30, Pa. *USS and National are registered trademarks*

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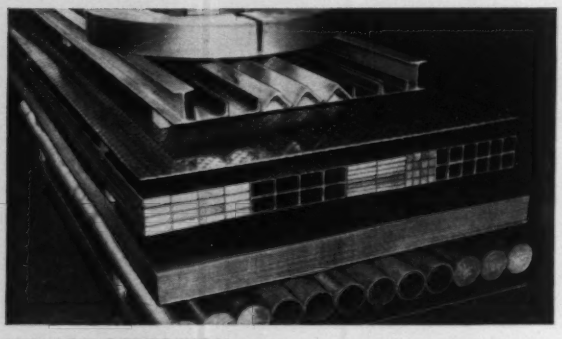
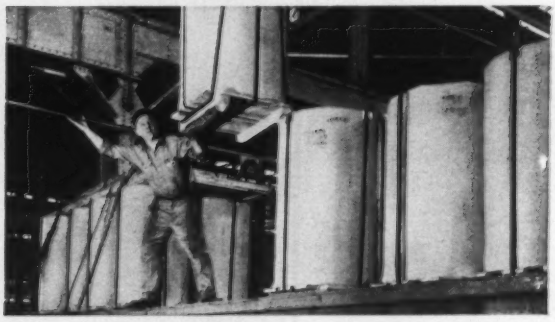
stretch aluminum-buying dollars



WIDEST SELECTION—At Ryerson you choose from the nation's largest stocks—available to meet your every need, large or small.

HELP IN SELECTION—Your Ryerson representative is Metalogics-trained to help you choose the best aluminum alloy for each application . . . and to assist you with fabrication problems.

FIRST WITH THE NEWEST—Ryerson is consistently first with the newest developments. For example, new low-cost building sheet that is helping customers save on many fabricated parts.



DEPENDABLE DELIVERY—Finest care in handling and packaging. Production-line-timed shipments assure fastest service. Any quantity—when you need it.

BE "METALOGICAL"—All the plus values of Ryerson service on Reynolds aluminum add up to the Ryerson science of giving "optimum value for every purchasing dollar." So be "Metalogical"—call Ryerson.

ALUMINUM IN STOCK

SHEETS All thicknesses, alloys and tempers—cut to any size • **COILS** Thicknesses from .008 to .125—slit to any width . . . cut to any length • **PLATES** Thicknesses from .250 to 4"; also tooling plate • **ROD** Rounds, ⅛" to 8" dia., cut or stock sizes; hexagons, 3/16" to 3" dia. • **BAR** Squares, ⅛ to 4" dia.; rectangles, ⅛" x ⅜" to 3" x 6" • **STRUCTURAL SHAPES** Angles, channels, tees and I-beams • **EXTRUDED ARCHITECTURAL SHAPES** Angles, channels, tees, I-beams, thresholds, sills, handrails, gravel stop, and coping • **TUBING AND HOLOBAR** Round, 3/16" to 6" diameter; also square and rectangular tubing • **PIPE** ⅛" to 6" diameter, to 20' lengths • **ROOFING AND SIDING** Corrugated, insulated wall, V-beam, ribbed siding, roof deck—plain or embossed; accessories, too.

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How 1961 Shapes Up

Here's how the staff of National Securities & Research Corp., New York, sees the economic indicators performing in 1961:

	1961	1960
	(Billions of dollars)	
Gross national product	508	503
Personal income	413	404.5
Farm income	34	34.1
Personal consumption spending	334	328
Private domestic investment	66	72.8
U. S. exports	21.0	20.5
U. S. imports	15.0	15.0
Manufacturers' new orders	368.5	360.0
Plant & equipment outlays	32.5	35.6
Industrial production (1957=100)	106.5	108.5

Skybolt, Missileer Suffer Cuts in Ike's Defense Budget

The Eisenhower administration's Pentagon budget request for fiscal 1962 does not include new funds for the Navy's Missileer, a new aircraft designed to launch missiles. The Air Force's Skybolt (bomber launched missile project) also ran into budget difficulty. The fiscal '62 defense budget calls for appropriations of $41.8 billion and spending of $42.9 billion. Military sources are hopeful that Mr. Kennedy will restore or increase funds for the Missileer and other projects.

Kennedy Plans Speedup in Space Program

The Kennedy administration will have a "vigorous and accelerated space program," Vice President-elect Lyndon Johnson has pledged. He told a press conference that spending for the space program will rise from about $2 billion in the coming fiscal year to almost $5 billion in fiscal 1965.

Romney Recants

George Romney, auto industry maverick and president of American Motors Corp., has apologized to General Motors Corp. for his statements charging that GM planned to use its foreign automotive facilities to produce parts for shipment into the U. S. "I was making broad references to the entire industry, not to any specific company," explains Mr. Romney. GM publicly refuted the charges, which were made in New York a few weeks ago. Ford and Chrysler never entered the debate.

New Profession Proposed to Meet 'Information Revolution'

A new profession to help top management deal with growing masses of research data has been proposed to the American Marketing Association by Marion Harper Jr., chairman, McCann-Erickson Inc. The "director of intelligence services" would be an aide trained in the "science" of decision making. He would direct the gathering of information for planning, recom-

mend action based on the information, and forecast the probable effects if a given recommendation is acted upon. His contribution would be measured by his ability to relate technical specifics to broad courses of action. He would not necessarily invent policy, but he would measure and help shape it. His goal: Select and interpret the information that would reduce unknowns to the practical minimum.

How to Build a Better Business Climate

You can influence the factors that form the industrial climate of your community. It's being done right now in Racine, Wis., by metalworking executives such as George Gorton III, president, George Gorton Machine Co. Faced with high taxes, wages that had outrun productivity, and public apathy toward industry's plight, these executives initiated a number of constructive moves aimed at making Racine a better city for industry. Their approach will suggest steps you can take (see Page 37).

USW Rebels' Movement Has Collapsed

There'll be no opposition for international officers of the United Steelworkers in next month's election. The rebels, who won 200,000 votes for Donald Rarick four years ago, haven't even been able to muster enough support to get their man on the ticket this year. Three other rebel leaders —Nicholas Mamula, Frank O'Brien, and Anthony Tomko—haven't been able to get on the ballot for district offices. It seems that the fence mending campaign of David McDonald has paid off for him in collapse of the opposition. It gives Mr. McDonald a strong position and could mean that he'll take a tougher stand in the next industry negotiations. Or it may mean that he'll decide he is strong enough, that he won't have to be so tough.

M. W. Kellogg Unveils New Type Fuel Cell

K. D. Miller, associate director, Research & Development Laboratory, M. W. Kellogg Co., demonstrates the firm's new fuel cell. It operates on a mercury amalgam of sodium, oxygen, and water and develops twice the voltage of hydrogen cells, the firm claims. The cell weighs less than 3 lb per kilowatt-hour of capacity. The firm has been awarded a $764,000 contract from the Navy's Bureau of Ships to design, build, and test a prototype powerplant based on the new fuel cell concept.

Will English Channel Be Bridged?

Three leading bridge building companies in Britain, France, and the U. S. have prepared detailed and costed plans for constructing a bridge across the English Channel. The 21 mile project would be one of the most spectacular engineering feats in history. It would probably carry a five lane highway, two railroad tracks, and two runways for cycles. It would use 800,000 tons of structural steelwork.

Forge Press Tackles the 'Impossible Jobs'

Eight of these main ram cylinders put a squeeze of up to 20,000 tons on forgings at Cameron Iron Works Inc., Houston. The press can also be used to extrude 30,000 lb parts—up to 30 ft long and 56 in. in diameter. With two, 5000 ton side rams, the press turns out intricate, split die forgings, in metals such as molybdenum, tungsten, tantalum, columbium, and all steel alloys. Cameron says the development gives the forging industry a better position in the race for Space Age business (Page 60).

Orders and Inventories Eased in November

Manufacturing firms received new orders totaling $29 billion (seasonally adjusted) in November—down less than 1 per cent from the October level, the Commerce Department reports. Factory inventories fell $300 million in November, about the same rate of liquidation as in September and October.

November Not Good for Most Industries

Shipments of industrial fasteners in November dropped 2 per cent from the October level to 81 per cent of the 1956-58 average . . . Sales of vacuum cleaners in November were 3.3 per cent below those in the like 1959 month . . . The gear industry got 9.5 per cent fewer orders in November than in October . . . New orders for industrial supplies and machinery fell 0.5 per cent in November . . . New orders for screw machine products in November climbed above the October level but equaled only 87 per cent of the year-earlier pace . . . New orders for resistance welding equipment in November rose 14 per cent above the October mark.

Boating: Growth Segment of a Growth Industry

The leisure market is one of the fastest growing segments of our economy, and boating is a leading part of it. During 1960, more than 40 million Americans spent $2.5 billion (retail) on the water activity. The Outboard Boating Club of America says boat fabrication last year took 70 million lb of aluminum.

Leisure Market to Boom

An expanding population with a 50 per cent rise in per capita income and a reduction in the workweek to 34 hours by 1980 will mean booming sales for the leisure market industry, points out D. S. Meiklejohn, vice president and treasurer, American Machine & Foundry Co. He says money spent on

STEEL The Metalworking Weekly

January 9, 1961 Vol. 148 No. 2

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recreation in the U. S. has risen from 3 per cent of total consumer expenditures in 1910 to 5.5 per cent of the average $2000 per capita income today—and will probably account for 6.6 per cent of an average $3000 per capita income in 1980. He adds that a similar trend is developing in Europe.

Steelmaker, City Get Together on Smoke Problem

The Youngstown City Council has given Youngstown Sheet & Tube Co. formal permission to install oxygen roof lances on open hearths at the Campbell Works, although the lances will cause more smoke to be poured into Youngstown's air. The council gave the firm ten years to work out a method of controlling the smoke.

New Tool to Spot Tool Steels

Universal-Cyclops Steel Corp., Bridgeville, Pa., has developed—and is offering free to tool steel users—a new, compact, easy to use "tool steel identifier" in slide rule form. More than 600 brandnames are identified.

Straws in the Wind

Youngstown Sheet & Tube Co. has cut salaries of employees in departments that are idle for extended periods . . . November, 1960, new business incorporations fell to the lowest level (12,412) since November, 1958, while business failures (1311) continued to exceed year-earlier levels for the tenth consecutive month, Dun & Bradstreet Inc. reports . . . 1960 heavy construction contracts reached a record $22.9 billion, says *Engineering News-Record* . . . January auto output schedules have been trimmed 10 per cent below the December level and 32 per cent below the January, 1960, total, says *Ward's Automotive Reports* . . . Federal tax collections reached a record $91.8 billion for the fiscal year ended June 30, 1960, says Commerce Clearing House . . . More moving stairs will be sold this year than ever before, predicts H. E. Peelle Jr., president, Peelle Co., Brooklyn, N. Y. . . . Grants totaling more than $1.4 million have been awarded to 159 colleges and universities in Du Pont Co.'s annual program . . . West Germany and the Soviet Union will exchange goods worth $887 million between now and 1963.

Metalworking Pulse

The Business Trend: Yearend holidays have taken their usual toll of industrial production. Recovery is likely to be less than normal, largely because of auto cutbacks. **Autos:** Year-ago comparisons are somewhat misleading for two reasons: 1. The holidays were not in comparable weeks. 2. In 1960, the industry was building stocks which had been depleted during the steel strike. **Steel:** A small tonnage increase followed the holidays. Look for a greater pickup shortly.

- **INDUSTRIAL PRODUCTION INDEX** (1947-49 = 100)
  Week ended ..... 134†
  Year ago 168
  Details on Page 47

- **PASSENGER CAR OUTPUT (UNITS)**
  Week ended Jan. 7 ... 80,000*
  Year ago 163,249
  Details on Page 44

- **STEEL INGOT OUTPUT (TONS)**
  Week ended Jan. 7 .. 1,300,000*
  Week ago 1,103,000
  Details on Page 96

†Preliminary. *Estimated.

cheaper by the slice!

If you make parts with a hole, you can save money if you use Michigan Seamless TAILORED TUBING. Tube stock is less costly, by the slice, than a comparable piece of bar stock. When you start with tubing, the hole is already there. No drilling required. This eliminates a drilling station and saves time. Because you have no chips from the center of the part, you save on scrap and scrap handling. Michigan Seamless makes a complete selection of fine carbon and alloy steel mechanical tubing. It's TAILORED to your specifications, round or shaped, from 3/16" to 3½" O.D. Wall thicknesses range from .032" to .625". For prompt answers to questions about application of mechanical tubing, write or wire Michigan Seamless Tube Company, 402 West Street, South Lyon, Michigan.

Steel

MECHANICAL AIRCRAFT, PLAIN AND FINNED HEAT EXCHANGER TUBING

MICHIGAN SEAMLESS TUBE COMPANY/GULF STATES TUBE CORPORATION

SOUTH LYON, MICHIGAN — ROSENBERG, TEXAS

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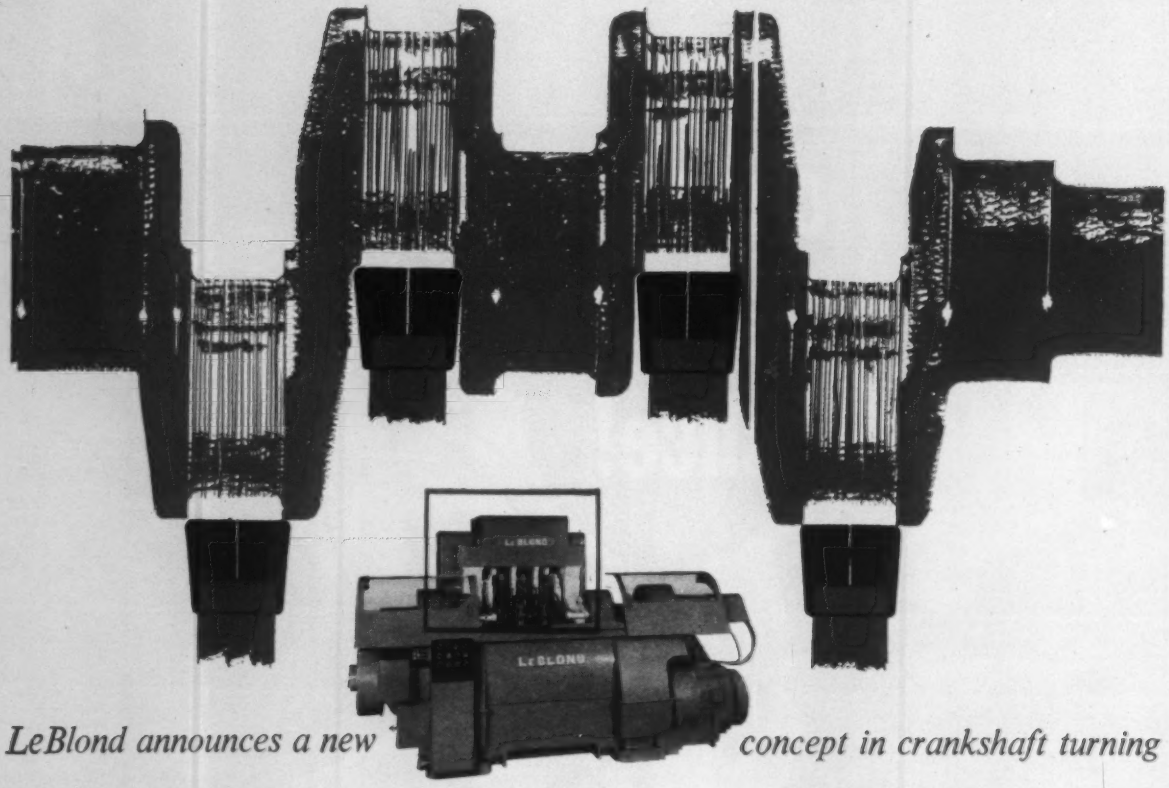


LeBlond announces a new **concept in crankshaft turning**

Automatic machining plus quick and easy tooling change-over—this is the unusual combination of advantages of our new 6PC Pin Turning Lathe.

All tooling, slides and master crankshafts are contained in a package unit which can be removed and a new tooling package installed in a few hours.

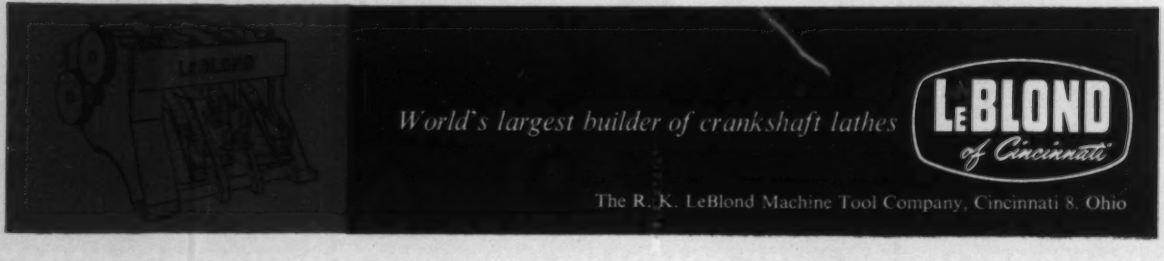
By this "package tooling" concept we eliminate the time delay heretofore required to send crankshaft machines back to the manufacturer for rebuilding. In addition, capital outlay is substantially less when you purchase a new tooling package and install it in your plant.

These packages are interchangeable so that any combination can be used to suit your needs. For example, you could have one base and three different tooling units. Additional packages or bases can be ordered at any time.

The LeBlond 6PC turns pin bearings, faces adjacent counterweight lobes, or both in a single machining cycle. It will handle forged or cast crankshafts with 2, 3, 4, 6, or 8 pins. It will accept cranks from 12″ to 41″ long with bearing diameters up to 5″.

Production rates will range from 10 to 40 per hour depending upon material, number of pins and webs to be machined, length of web cut, etc.

If flexibility is more important than maximum production rate in your shop, we would like to discuss the 6PC with you. Our latest catalog describes this new machine as well as our high production crankshaft lathes. Ask your nearby representative or write.


World's largest builder of crankshaft lathes
LeBLOND
of Cincinnati
The R. K. LeBlond Machine Tool Company, Cincinnati 8, Ohio

Engineering Breakthrough!

For a long time, we have been advocating the elimination of some of the evils of free engineering.

Too many people in industry send out requests for construction, plant, and equipment proposals that are merely fishing expeditions.

The recipients of the requests often feel compelled to spend thousands of dollars on engineering work in the knowledge that only one—or perhaps none—of them will get an order.

This appalling waste of engineering time and manpower, most people agree, should be reduced.

But so far, few have been willing to do anything except applaud or offer encouragement.

Brown & Sharpe Mfg. Co. is a notable exception.

It is asking its customers and prospects to send along a purchase order with each inquiry for an engineering proposal involving cams, tooling, or special attachments for automatic screw machines.

When each proposal is submitted, the customer will be invoiced for $15.

But the $15 charge will be credited to the customer's account if, as a result of the proposal, he buys tooling, a machine, or an attachment.

Says Brown & Sharpe: "We believe this practice will discourage inquiries being sent to us when there is no intention of following our recommendations, as has happened in the past."

The $15, of course, will not cover engineering costs, but it should eliminate some of the nonproductive engineering work that has prevented Brown & Sharpe's engineering department from devoting more of its time to bona fide inquiries.

We think Brown & Sharpe is on the right track.

We hope you will agree that this is a good time to join the movement to reduce one of industry's biggest and most unnecessary wastes.

Engineering is never "free."

No matter whether you are a supplier or a customer, you help pay for it!

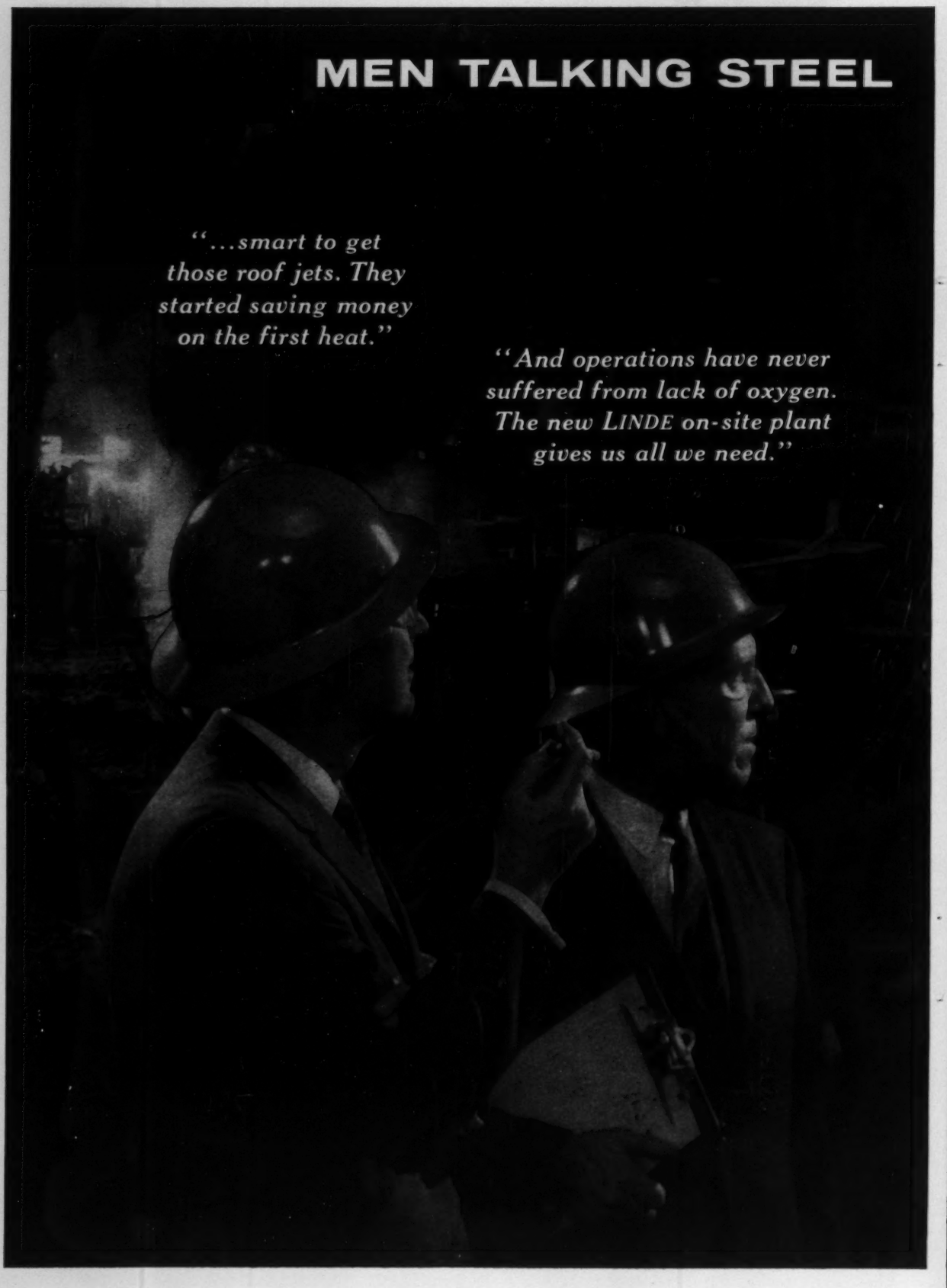
Irwin H. Such

EDITOR-IN-CHIEF

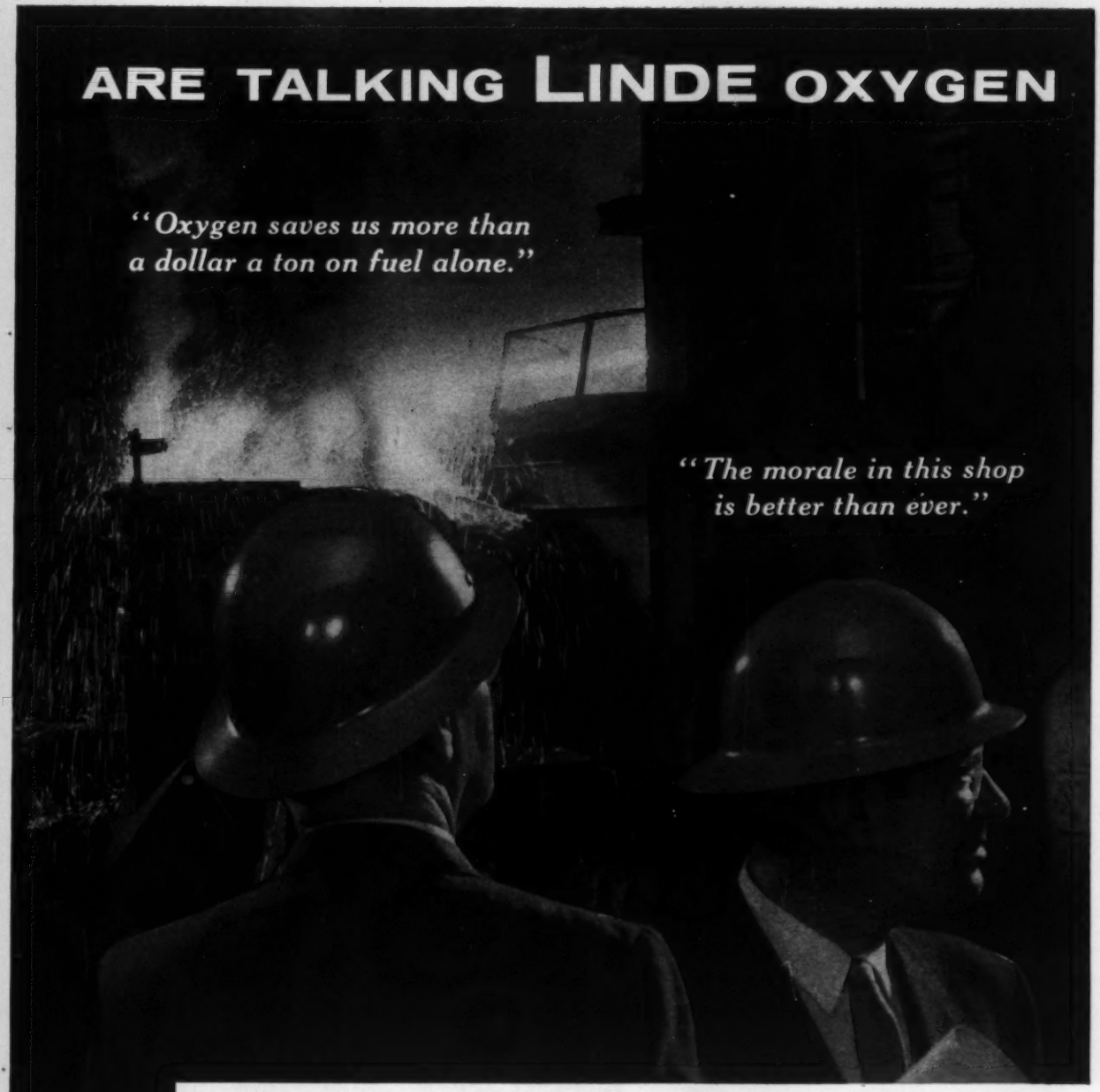
MEN TALKING STEEL

"...smart to get those roof jets. They started saving money on the first heat."

"And operations have never suffered from lack of oxygen. The new LINDE on-site plant gives us all we need."



ARE TALKING LINDE OXYGEN



It takes LINDE to apply "*total gas technology*" to steelmaking, and you can get the facts that prove it by writing Linde Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y. *In Canada:* Union Carbide Canada Limited, Linde Gases Division, Toronto 12.

LINDE COMPANY

UNION CARBIDE

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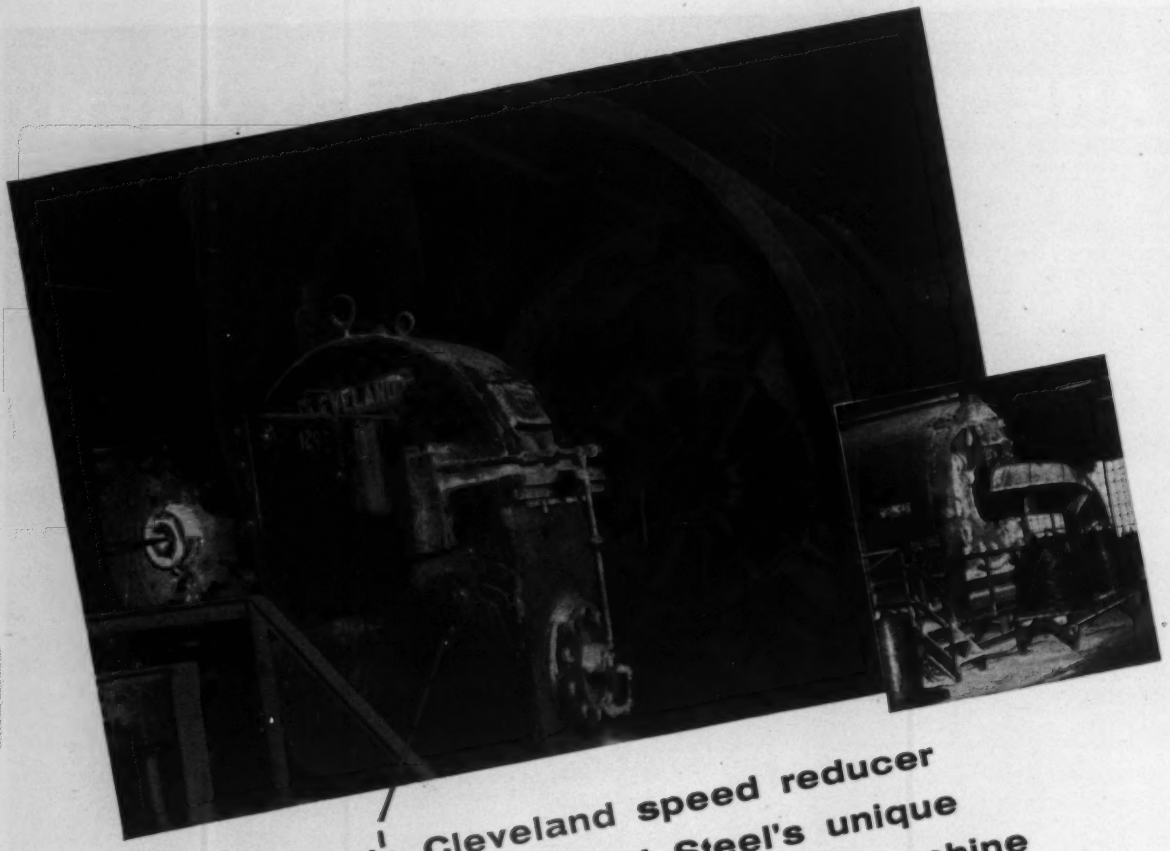

This versatile Cleveland speed reducer smoothly drives Sheffield Steel's unique stationary bull block wire drawing machine

Here's a Cleveland-driven wire drawing machine, made by Morgan Construction Co., that draws wire up to .670" at an operating efficiency better than 90% — as compared to 40-60% for conventional machines. Its stationary bull block feature makes the machine's operation practically continuous.

Incoming wire passes through a special hollow shaft that carries the gear in the drawing machine's large, heavy-duty Cleveland worm gear drive. This successful, proven installation at Sheffield Div. of Armco Steel Corp., Kansas City, Mo., is revolutionizing the drawing of large wires for boltmaking.

Industry has found through experience that wherever a quiet, compact, right-angle worm gear drive is required, it's a job for a Cleveland—progressive pace setter in power transmission for over the last 47 years.

Talk over your current requirements with a Cleveland Representative today. Or, write us direct for your free copy of Bulletin No. 145 containing up-to-date engineering information.

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Speed Reducers

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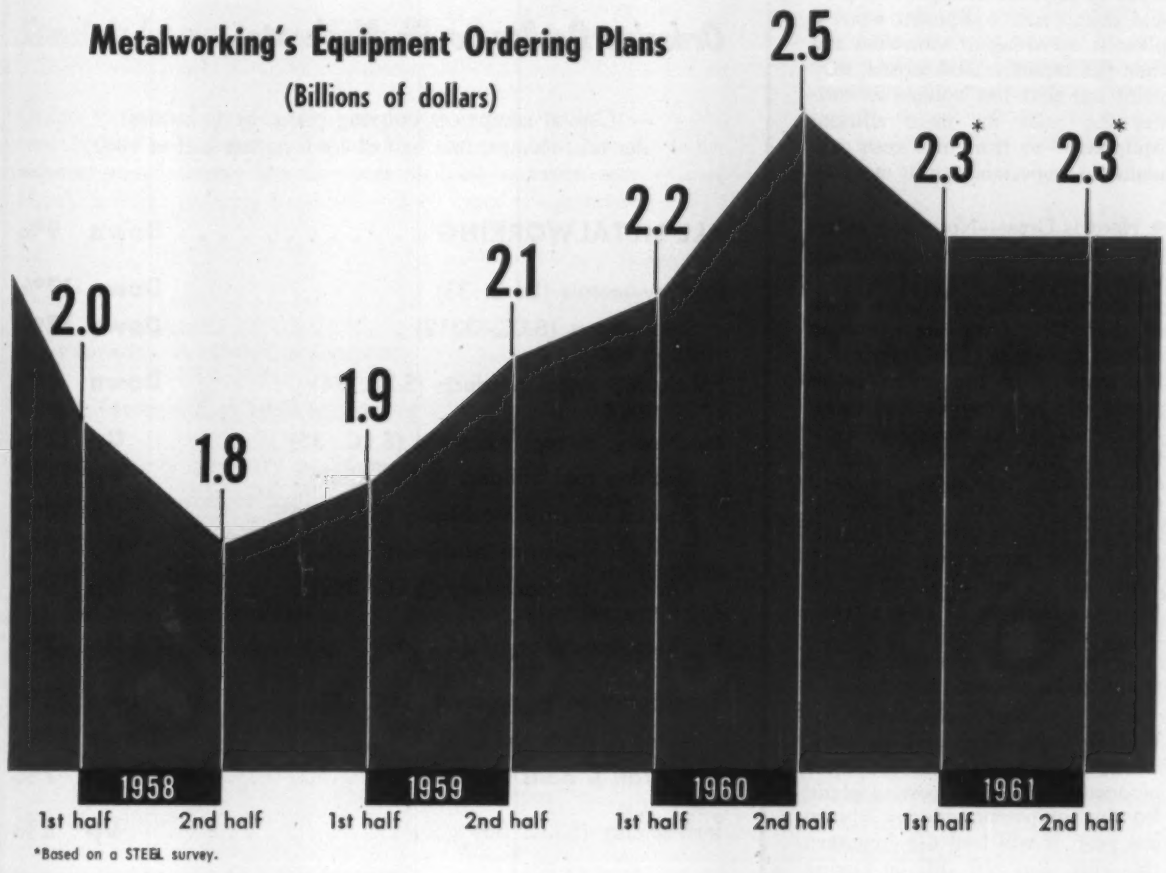


'61 Equipment Buying to Hold High

METALWORKING companies will order $4.6 billion worth of capital equipment this year—only $100 million below last year's total.

• About the same dollar volume of orders will be placed during each half of this year.

• Order volume during 1961's first half will drop only 9 per cent below the volume placed during 1960's last six months.

Those are findings of STEEL's latest survey of metalworking's equipment ordering plans. Companies that buy nearly one-third of all capital equipment purchased by the metalworking industry have told STEEL, confidentially, their equipment ordering plans for 1961. After a similar survey last June, STEEL predicted that metalworking would order $2.5 billion worth of capital equipment during 1960's second half and a total of $4.7 billion worth during all of 1960 (see STEEL, July 11, 1960, p. 45). The prediction proved correct.

• **Good Sign** — The results of STEEL's latest survey are reassuring. Many economists had forecast 1961 capital spending might be cut back as much as 10 to 15 per cent. Such a steep decline would work in favor of a sharp recession. But it appears the decline will be surprisingly moderate. And outlays for equipment may prove to be one of the principal bulwarks in the economy this year.

• **But Beware**—Continued softness in demand for hard goods could force sharper cutbacks than are indicated by the survey. During recessions, industry tends to overestimate its outlays for equipment, revising the figures downward as the months pass. That happened in 1958 and, to a degree, in 1960.

A significant number of the survey respondents note that they will consider postponing some planned purchases if it appears that the recession will be deep and prolonged.

However, many respondents also make an opposing point—that a time of demand softness is con-

venient for modernization of facilities. First, they note, it's easier from a purely physical standpoint to plan and install new equipment when a plant is operating at somewhat less than full capacity. And second, they point out that low volume intensifies the need for more efficient equipment—to trim unit costs and maintain respectable profit margins.

• **Need Is Great**—Not many orders will be placed for equipment designed solely to expand capacity; metalworking already has too much of that. Few firms are operating above 70 per cent. The overwhelming majority of the orders to be placed will be aimed at modernization. Price fighting among domestic firms in nearly every segment of metalworking intensifies the need for lower unit costs. And ever increasing pressure from foreign rivals further accentuates that need. Many plants are also tooling up to take advantage of new marketing opportunities opened by the industry's huge investments in research and development.

• **Steel Lags**—The steel industry, which is determined to get more production out of its existing plant, led the equipment ordering upturn last year. It will lead the downturn this year. But it'll still be buying more equipment than it did in 1959. Its volume of orders during 1961's first half will be 17 per cent below the volume placed during the last half of 1960. Tentative plans for the second half of this year show a decline of only 1 per cent from the level of the first half.

• **Machinery Makers Lead**—Producers of nonelectrical machinery—items ranging from typewriters to tractors—will unleash more dollars for equipment during the first half of this year than they did in the last six months of 1960. The bulk of the increase here will be accounted for by office equipment makers, machine tool builders, and producers of machinery for the food, textile, paper, printing, and woodworking industries.

• **Electrical Up**—Manufacturers of electrical machinery, who traditionally spend more money for new equipment during the last half of a year than in the first half, indicate that they'll order 2 per cent more equipment during the first half of 1961 than they did in the last half of 1960.

• **Drop in Autos**—Producers of motor vehicles and parts say the dollar volume of equipment they will order this six months will be 18 per cent below the volume they placed during the last half of 1960. But several managers note that additional plans are in the works and could be turned into orders if business conditions improve.

• **Who'll Benefit**—STEEL asked the survey respondents what types of equipment they will order in the coming six months. While such plans are highly subject to change, the results give some tips to capital equipment producers.

• **Machine Tools**—At this point, the survey respondents plan to make available more dollars for machine tools during the first half of 1961 than they did during the last half of 1960. But not all respondents have their plans detailed yet, so that indicated trend may change. Manufacturers of nonelectrical machinery report the largest increase in ordering plans for machine tools: They say that they'll boost buying 25 per cent in 1961's first half vs. the last six months of 1960. Producers of electrical machinery and fabricated metal products predict slight increases in their ordering of machine tools. Primary metal producers and

Ordering Decline to Be Moderate . . .

(Capital equipment ordering plans, by industries)
Per cent change, first half of 1961 vs. last half of 1960

ALL METALWORKING	**Down 9%**
Primary metals (S.I.C. 33)	Down 17%
Steelmakers (S.I.C. 3312)	Down 17%
Fabricated metal products (S.I.C. 34)	Down 6%
Machinery, except electrical (S.I.C. 35)	Up 12%
Machine tool builders (S.I.C. 3541)	Up 11%
Special industry machinery (S.I.C. 355)	Up 20%
General industrial machinery (S.I.C. 356)	Up 8%
Agricultural machinery (S.I.C. 352)	Up 5%
Electrical machinery (S.I.C. 36)	Up 2%
Transportation equipment (S.I.C. 37)	Down 15%
Autos & parts (S.I.C. 3717)	Down 18%
Aircraft & parts (S.I.C. 372)	Up 7%
Instruments (S.I.C. 38)	Up 2%

Steel Industry Leads Spending Downturn . . .

Orders for capital equipment to be placed during the first half of this year by the steel industry will total 17 per cent less than the dollar volume placed during the last half of 1960, a STEEL survey finds. Here's how the ordering trend will run by types of equipment . . .

	1st half, 1961 vs. 2nd half, 1960
Blast furnaces & related equipment	Down 18%
Electric furnaces & related equipment	Down 12%
Rolling mills & auxiliary equipment:	
Flat rolled product facilities	Down 28%
Blooming mill facilities	Down 25%
Bar mill facilities	Down 50%
Tubular product facilities	Down 10%
Structural product facilities	Up 10%
Cleaning & finishing equipment	(a)
Material handling equipment	Down 25%
Testing & inspection equipment	Up 10%

(a) Up more than 100 per cent, due to two major programs.

automakers say their machine tool ordering will decline.

• **Handling Equipment** — Metalworking plans to order a lower dollar volume of material handling equipment during the first half of this year than in 1960's last half. The drop will come from customers in these industries: Primary metals, fabricated metal products, and transportation equipment. Slight increases in orders are planned by producers of machinery (electrical and nonelectrical) and instruments.

• **Cleaning, Finishing**—Thanks to a couple of major programs in the steel industry and some ambitious plans by machinery and instrument makers, orders for cleaning and finishing equipment are likely to be somewhat higher during the first half of this year than in the last half of 1960.

• **Office Equipment**—Orders during this six months will hold close to the level of the last six months.

• **Testing & Inspection**—The emphasis on reliability improvement is apparently behind metalworking's plans to increase—slightly—its dollar volume of orders for testing and inspection eqiupment.

• **Heat Treating**—A decline in dollar volume of orders for heat treating equipment is indicated by the survey results.

• **Joining, Assembly**—A lower volume of orders to be placed by makers of electrical machinery and motor vehicles will not be offset by the slight increases planned by producers of aircraft, instruments, and nonelectrical machinery. Result: Fewer orders for joining and assembly equipment this half than last half.

Top Job Openings Drop Substantially

IF YOU'RE in the market for a job, your chances of landing one are so-so, although the number of openings has declined recently.

Executrend, an index of executive demand based on newspaper ads for managers compiled by Heidrick & Struggles Inc., Chicago, shows changes in demand during the last quarter of 1960 vs. the last quarter of 1959:

General administration	−44%
Manufacturing	−11%
General engineering	−24%
Defense engineering	−43%
Marketing	− 7%
Personnel	− 1%
Financial	+ 4%
Total	−15%

The index pegs executive demand at the lowest level since mid-1958. Total demand is off about 3 per cent from the level in 1960's third quarter.

A similar survey of demand for engineers and scientists, compiled by Deutsch & Shea Inc., New York, gives this comparison (July, 1960, equals 100):

August	97.6
September	107.7
October	116.2
November	113.3

A survey of 178 companies by Executive Manpower Corp., New York, finds that high paying job opportunities among small and medium size companies will not slacken. EMC says the need for sales and engineering executives is stronger than it was in June, 1960, but demand for production chiefs has dropped sharply.

Managers fret about the paper bombardment . . .

How to Write a Better Report

GIVE AN ENGINEER a slide rule and some graph paper and he becomes one of the world's most communicative creatures. But put him in front of a typewriter and he freezes. That isn't the engineer's fault. He seldom gets much formal training in writing. His aptitudes and skills are geared to other forms of expression.

Many times managers don't help. They have a peculiar tendency (think engineers) to ask for too many reports, too often. Then they may forget to tell the engineer the kind of report they want. After they get it, they don't bother to tell him what they do with it. That can be discouraging to anyone who finds writing an unappealing task at best.

But engineers can learn from the pros. From STEEL's own writing symposiums and from the methods other writers use, here are some simple guides that can make report writing easier.

Think Clearly

Clear thinking is the first step to clear writing. Ask yourself these questions:

- What's the purpose of this report?
- Who will read it?
- How do I want to present it?

Your report may be a simple progress bulletin or it may be a detailed technical study covering a complete project. Top management may read it, in which case you'll want to slant it toward the financial or sales side. Management usually wants to know how your report will help boost sales or cut costs. Perhaps it's aimed at other engineers so you'll want to put it in terms they understand best. Technically trained people want to know how your findings compare with similar studies, what techniques or procedures are new. Depending on how the report is initiated, you may be trying to persuade, report, educate, or explain.

Organize Completely

Reports that are incoherent because of vagueness or confusion are useless. Know what you want to say, then determine the order in which you should say it. This calls for complete information and a good outline.

Collect all the charts, graphs, data, and background information you can on your subject. It may help to list all the information you've collected. That will start you thinking of ideas to write about. Start jotting them down. If it's to be a one page report, a list may be all the outline you'll need. You can summarize your conclusions in a "lead" paragraph and follow that with the details.

For lengthier reports, you'll need a more elaborate outline. Put all similar ideas together into main groupings. Those in turn can be put in the order that will best meet the purpose of your report.

Here are some main groupings contained in a "formula" outline that can be adapted for many kinds of engineering reports: Objectives, Conclusions, Recommendations, Test Specimen, Test Requirements, Test Equipment, Test Procedure, Test Results, Discussion, References. A hint: If you're writing for management, put the conclusions and recommendations first. Go light on details. Management usually is interested only in results and accomplishments.

Write Concisely

Now you're ready to put words on paper. Don't wait for inspira-

tion, just dig in and start writing.

The lead paragraph is most important. Here's where you have to bait the hook so you can lure your reader through the rest of the report—and finally land him on your side. He won't break away if you catch his attention with that opening statement. Summarizing your points in the lead will hold your reader 99.99 per cent of the time. Unless you're a natural joke teller, forget the snappy openings. Whoever reads your report wants information, not entertainment. A good guide post: Limit that first paragraph to 100 words or less.

As you follow your outline, write naturally—as if you were talking to someone about the subject. If you're accustomed to dictating, that's a fine way to "talk out" the first draft of your report.

Keep sentences short. Avoid passive verbs; they lack color and action. Explain any technical terms your readers may not understand. In nontechnical portions of your report, use the simplest words and phrases possible. Instead of saying: "It is the opinion of this author," say "I think."

Avoid cliches like "rain on a tin roof," or "red as the sunset." They mark you as an amateur. Use familiar objects for comparisons such as "this ceramic sphere is about the size of a coconut." Don't try to be clever or you'll wind up being cute.

When you reach the end of your outline—STOP! If you have not opened your report with a summary or recommendations, a brief summary provides an effective conclusion.

Cull Carefully

Most professional writers agree that editing is the toughest part of the job. If possible, wait a few hours or even days before editing your report. It helps your objectivity.

Chop out unnecessary words and phrases like "in addition to," "therefore," and "however," usually found at the beginning of paragraphs. One technique you might try: Strike out every other word in the report, then put back only those words that are absolutely necessary to make sense.

If you're writing a long report, now's the time to put in subheads (short, summary headlines) before each major point. Subheads can be short sentences. Charts, photographs, and other illustrative material can be placed in the body of the report if they are simple and well spaced. If you have many illustrations, include them in an appendix or reference section.

Check spelling, grammar and sentence structure. Does your report "read" logically and easily? Is it neat and well laid out? Managers appreciate well written reports. It's worth learning how to write them.

Tips for the Boss

- **Do you explain why reports are needed and report back on how they're used?**
- **Do you have specific report form standards so engineers will know what you want in each report?**
- **Do you request reports on a project completion basis rather than on regular time intervals? Engineers often complain that they have to turn in reports every month whether they've accomplished anything or not.**
- **Do you offer some training or information on report writing?**
- **Do you provide assistance from technical writers or trained secretaries? Some firms have set up a pool system.**
- **Do you use a "fill in the blanks" report form for short progress bulletins?**

Continuous Metal Process Simplifies Sheet Production

THIN SHEETS AND STRIP are being produced continuously at room temperature in the Powder Metallurgy Laboratory, Stevens Institute of Technology, Castle Point Station, Hoboken, N. J.

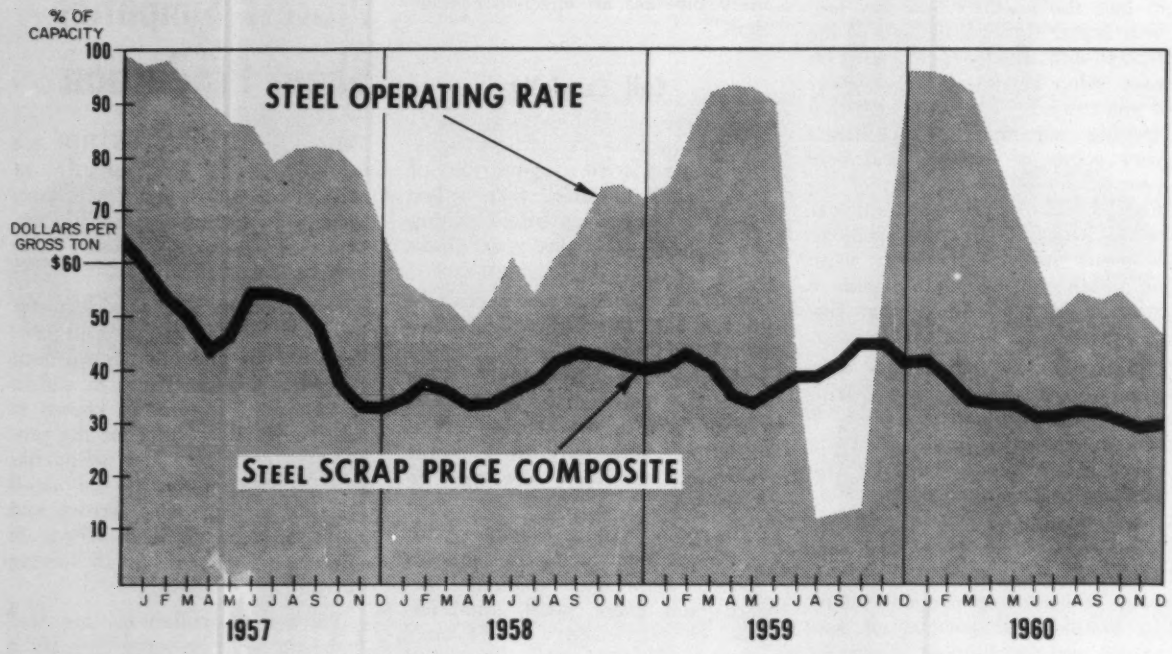
Prof. Gregory J. Comstock, director of the laboratory, says that powdered metals and alloys have been rolled to 0.003-0.007 in. in widths up to 6 in. The process, known as continuous slip casting for the production of sheets and strip, has worked successfully in the small laboratory stages with ferrous and nonferrous metals and alloys. It eliminates as many as 15 forging or rolling operations.

Physical characteristics are said to be the same or better than those of metals produced by melting and hot rolling. In some alloys, improved physicals are the result of the absence of cast structures. The materials are particularly suitable for deep drawing, says Professor Comstock, and can work in any job normally requiring hot rolled materials.

• **How It Works**—In the process, metals or alloys in the form of fine powders are suspended in a liquid. The suspension, called slip or slurry, resembles the pulp suspension in paper manufacture. Suction rolls in the slurry pick up a film. The film is then dried on the roll and passed continuously in sheet form through controlled atmosphere furnaces where the sheets are heated to just below their melting point. The sintering consolidates the sheets which are then sent through mechanical rolls for sizing and densification. Rolling tolerances can be closely controlled. A subsequent heating brings the sheets to required density.

Professor Comstock is seeking contracts from companies to further applied development at Stevens. He will undertake laboratory studies of single metals and alloys at Stevens and do parallel pilot plant work as a consultant in any client's plant.

Scrap Prices Parallel Steel Operations


% OF CAPACITY
100
90
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DOLLARS PER GROSS TON
$60
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Scrapmen Fight to Stem Downtrend

THE THREAT of a long term downtrend in the consumption of purchased scrap is the No. 1 problem of the $2-billion-plus scrap industry.

That's the consensus of scrapmen attending the annual meeting of the Institute of Scrap Iron & Steel Inc., which opened yesterday (Jan. 8) at Miami Beach, Fla.

Concern over scrap market shrinkage has been mounting since the introduction of new steelmaking techniques—notably the basic oxygen processes. They make steelmakers less dependent on scrap in furnace melts.

Scrapmen recognize that the acceptance of scrap as an economical furnace charge can be extended only if they can make their product fully competitive (qualitatively and pricewise) with other charge metallics (notably hot metal).

Topics being covered during the four day conference include: Marketing, freight rates, cost control, research and development, equipment, yard maintenance, and executive compensation. Milton K. Mahler, president of Morrow Steel Co., Detroit, is president of the institute.

● **Consumption Declines** — Use of purchased scrap in 1960 is estimated at around 27 million net tons. That's down from about 29 million in 1959 and compares with 32.9 million in 1950. The peak year of the last decade was 1956 when 39.2 million tons were used.

Exports in 1960, aggregating around 7 million net tons and probably setting a record, reduced the impact of the drop in domestic consumption. Domestic use and exports in 1960 are estimated to be above 34 million net tons. Scrapmen expect their total movement this year will exceed 35 million.

The proportion of scrap in furnace melts started to go up late in 1960, but the reversal of the downtrend is thought to be temporary. The development is explained by attractive prices. STEEL's composite on No. 1 heavy melting steel averaged $28.92 in December, the lowest monthly average since 1954.

● **Scrap Parallels Steel**—Scrap prices (see chart) pretty much move along with the steel ingot rate. For many years, the scrap price trend was considered highly barometric for steel operations. Recently, though, it has lost some of its potency because of the increase in hot metal availability.

W. S. Story, assistant executive vice president of the institute, says scrap used in steelmaking furnaces in 1949 accounted for 49 per cent of the furnace charge, but by 1959 the proportion had dropped to 43 per cent. Latest data show that in September and October, 1960, scrap

represented 52 per cent of the furnace charge.

• **Impact Concealed** — Mr. Story says the impact of technological change in steelmaking on purchased scrap has been obscured by high steel production over the last decade. He thinks the real impact is being felt for the first time now and maintains that only larger exports the last couple of years have prevented the scrap industry from being in worse shape than it is.

The institute spokesman thinks resumption of long term growth in scrap use is unlikely until more scrap processors move actively to promote the sale of their product by tailoring it more closely to the needs of their customers. He cites introduction of new ideas and equipment as factors aiding processors to hold present markets and regain the favor of cost conscious steelmakers.

Last year, more dealers installed hydraulic guillotine shears (costing $100,000 to $200,000 per unit) to cut scrap to furnace size. A new rotary shear has also been receiving attention. Installations of a new type of yard equipment that literally shreds steel now exceed $1 million in value. Other yard equipment being installed on a wide scale includes combinations of balers and shears to make scrap bales of much greater density than heretofore.

• **More than Collectors**—President Mahler's views are much the same as Mr. Story's. He maintains that processors (dealers) must recognize they are manufacturing a product (No. 2 bundles), not simply collecting and segregating material. He says the industry must trim operating costs, reduce fixed overhead, gain better knowledge of costs.

Civilian Reactor Projects Worth $942.6 Million

The estimated cost of all civilian reactor projects actively under design or construction is about $942.6 million, reports the Atomic Energy Commission in its latest quarterly survey.

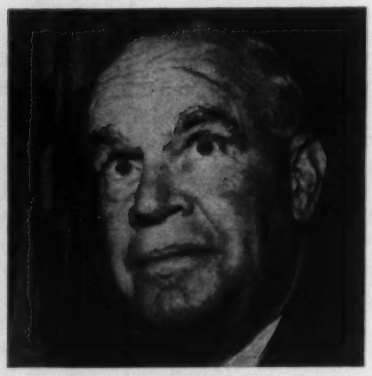
Projects included in the survey: 22 electric power prototypes and experiments; the propulsion plant for the *N. S. Savannah;* 24 research and test reactors.

New 630 ton crane provides pinpoint control

This gantry crane moved a huge generator rotor into place inside a pit mounted stator (bottom). The 70 ft crane, which moves on rails, was manufactured and erected on site at Robert Moses Niagara Powerplant, Niagara Falls, N. Y., by the Milwaukee Crane Div., Novo Industrial Corp. The rotor, 35 ft in diameter, was fitted into place with only ⅝ in. clearance. Operators also simultaneously aligned 24 hollow shear pins, fitting them into the shaft thrust block. The "open-deck" construction eliminates the need for the usual aboveground powerhouse — the power generating equipment will be in 13 subsurface pits

ROBERT McNAMARA
Secretary of Defense

ARTHUR GOLDBERG
Secretary of Labor



LUTHER HODGES
Secretary of Commerce

STEWART UDALL
Secretary of Interior

DOUGLAS DILLON
Secretary of Treasury

ROBERT KENNEDY
Attorney General

A Glimpse at Key Cabinet Members

THE MEN ABOVE will have a lot to say about the economic direction metalworking takes in the next four years. Here's what to expect from them:

Treasury Secretary Dillon, a holdover from President Eisenhower's State Department, calls the balance of payments problem (and our loss of gold overseas) the most serious question he faces. He'll deal with it in about the same way Treasury Secretary Anderson has during the last days of Ike's term. Requests will be made to keep foreign aid in the $4 billion a year range, so Secretary Dillon's main efforts must be to get Western Europe and Japan to help bear the load.

Defense Secretary McNamara could be the man needed to straighten out the Pentagon. He probably won't try to force the Symington reorganization plan down the throats of Congress, but he could eliminate some duplicating projects among the services.

Attorney General Kennedy, an expert in crime investigation but not so familiar with the intricacies of antitrust legislation, will probably ask Congress to beef up his investigatory powers over business, but may center his first attention on organized crime.

Commerce Secretary Hodges is an internationalist in trade sentiment and will not be of particular help to metalworkers seeking further protection from foreign competition. Still, he will do his best to put some guts into our "boost the exports" program.

Labor Secretary Goldberg, called a lawyer's lawyer by some, brings a real bias to the Labor Department. His background with the USW is certain to influence his attitude toward legislation designed to handle big strikes. He may find his more liberal legislative requests bottled by a conservative Congress.

Interior Secretary Udall appears to be the best advocate of mining interests to come to the cabinet in years. He will certainly seek a "long range minerals program" from Congress to protect domestic interests and insure a strong minerals base for defense purposes.

Heavy cutting capacity of a CINCINNATI Vertical Dual Power Dial Type Milling Machine is demonstrated in this setup. The complete Cincinnati line includes 40 size, style and power ratings. Catalog M-2134.

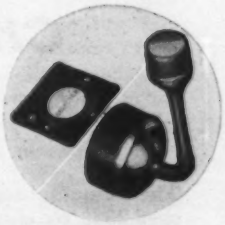
THE BIG DIAL TYPES

QUICKLY CUT METAL AND COSTS

It's a revelation to see Cincinnati Milling's big High Power and Dual Power Dial Types . . . how easily they can be handled . . . how quickly they cut metal and costs. The following facts tell some of the reasons why:

- Extra heavy throughout, to permit smooth, heavy stock removal
- Powerful drive—50 hp motor for larger sizes
- Single lever control of table feed and rapid traverse (plain and vertical machines)
- Four-position turret stop and vertical feed to head of vertical machines
- Hydraulic spindle starting, front and rear working positions
- Flywheel mounted on spindle—a feature-advantage for high speed carbide milling

These and other advantages give the CINCINNATI High Power and Dual Power line the highest value for replacing old knee type milling machines now inadequate for heavy duty toolroom and production milling. Complete details are contained in catalog No. M-2134. Write today for your copy, or telephone Cincinnati REdwood 1-2121. **Milling Machine Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.**



Power feed and speed changes in increasing or decreasing order with one lever. An exclusive Cincinnati advantage.

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Champion Upset Forging Cuts Finished Gear Cost 23%!

The manufacturer of this pinion gear cuts finished cost 23% by starting with Champion upset forged blanks. He saves on material by using a 1¼" x 5" blank with a 1¾" collar instead of 1¾" bar stock. He saves again because most rough machining is eliminated.

Upset forgings can save you money and give you better quality too . . . upsetting increases strength by directioning grain flow in the metal. Check your products for parts like this . . . then call —

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When it's a vital part, better make it FORGED

How to Build a Better Business Climate

H. M. PACKARD, president, Johnson's Wax, stands before a Racine landmark, the Johnson Building, designed by Frank Lloyd Wright

● On the shore of Lake Michigan, midway between Chicago and Milwaukee, is sprawled one of metalworking's little giants, Racine, Wis. With only about 85,000 people, it's the home of more than 200 metalworking firms. But its traditional position in the hierarchy of industrial cities is threatened—by taxes, wages, and attitudes. Much industry has been lost, little gained.

Racine's leaders have pinpointed the reasons for the city's industrial decline and are taking the initial steps toward rejuvenation. If they are successful, executives seeking new plant sites may once again court the Belle City.

To metalworking managers, the Racine story has special significance. It's a test of whether industrial leaders can get an entire community to build an industrial climate conducive to growth.

NOT ONE major manufacturing concern has moved into Racine, Wis., since 1928. During the last 12 years, 11 companies have transferred part of their operations out of Racine, or discontinued operations, costing the community 4275 jobs. Another 13 Racine companies established new operations in other cities, costing the community an additional 3745 jobs. Racine has had a net loss of more than 2500 industrial jobs during the last decade, although the town's population has climbed by more than 13,000.

The prosperity of any community depends upon the level and trend of its "source money"—payment for goods and services provided to areas outside the community. Manufacturing—especially metalworking—dominates as Racine's source of new money. So the climate pro-

"Determine what needs to be done to improve our economic climate . . ."

That was the assignment given by Mayor Jack Humble (center) to George Wheary (left), former head of Wheary Luggage and a Racine civic leader; Arthur Dixon (right), president, Modine Mfg. Co., and 13 other Racine citizens, who formed a "Mayor's Committee"

vided for Racine's industry is vital to the creation of new jobs and maintenance of existing jobs. That climate has deteriorated; the community hopes to restore it.

• **Behind the Problem** — The reasons for the decline in the city's industrial climate are threefold—and common to some other U. S. cities. They are high corporate taxes, wage scales that have outrun productivity gains, and public apathy toward industry's problems.

If you are faced with similar problems in your community, perhaps you can borrow from the Racine approach to initiate an improvement program of your own. Racine is adopting positive measures to solve all three problems.

Among the steps already taken:

• The Manufacturers' Association of Racine, with the aid of the Employers' Labor Relations Information Committee, New York, took a "community inventory." In it, 48 manufacturers analyzed their operating environment by answering 125 questions, some with a dozen subquestions. From that survey, the community has been able to pinpoint the plus and minus factors in its industrial climate.

• At the suggestion of the manufacturers, Racine's Mayor Jack Humble appointed a committee of 15 citizens to determine needed improvements in the economic climate. Composed of civic leaders, union officials, manufacturing executives, and merchants, the committee made its report in November.

• The Manufacturers' Association is sponsoring a series of political education seminars.

• At the suggestion of Racine's manufacturers, a fact finding questionnaire on Wisconsin's industrial climate has been issued to all manufacturing firms in the state employing 50 or more.

• The Racine Vocational & Adult School has established a Technical Training Institute, to improve vocational training in the community.

• Twin Disc Clutch Co., Walker Mfg. Co., and George Gorton Machine Co. have retained George J. Rogers, Morton Grove, Ill., consultant, to design economic education programs for their employees.

New Look at Taxes

Racine's tax problem is shared by all Wisconsin manufacturers. The state has a corporation income tax—unlike Illinois, Indiana, Michigan, and Ohio, the four states in which most competitors of Racine companies are situated. And Wisconsin ranks second highest in per capita corporate income taxes in the U. S. An independent study of Racine made several years ago pointed out that a typical Wisconsin corporation has a state tax load double what it would bear in Minnesota, more than three times what it would pay in Michigan, and about 13 times what it would pay in Ohio.

H. M. Packard, president, Johnson's Wax, and a member of the governor's tax study group, reports that Wisconsin industry pays taxes that are 30 to 44 per cent higher than industry pays in six neighboring states. He also notes that the property tax in Racine has risen 131 per cent since 1950.

The result: Manufacturers in Racine—and throughout Wisconsin—have been placed at a competitive disadvantage in the market place.

• **Four Pronged Approach**—These moves are being made to improve the tax situation:

1. In June, 1959, Gov. Gaylord Nelson appointed a 19-man commission to study the state and local tax system and recommend improvements. In its initial report (Nov. 30, 1960), it recommended complete repeal of the tax on man-

ufacturers' inventories.

2. The Manufacturers' Association of Racine has prepared a tax study showing the difference in tax costs between Racine plants and plants of the same companies situated in other states. Object: Drive the problem home to the public.

3. The Racine Chamber of Commerce has initiated an organized effort aimed at complete revision of the Wisconsin tax structure.

4. The Mayor's Committee recommended: "Urge to Wisconsin's state administration and legislature that industry which is absolutely essential to Racine's economic health is being repelled by inequity of this state's industrial tax rates. . ."

Among the proposals currently being made: Revise the income tax and perhaps institute a sales tax.

Wages and Productivity

The level of wages paid by Racine industry is among the highest in the country. But there is little evidence that productivity is greater in Racine than in lower wage areas —there's considerable evidence that it is not as high as in some other areas.

For example, 13 companies with plants in Racine and other areas report that output per manhour in Racine is from 15 per cent greater to 95 per cent lower than in the other locations.

Asked what they disliked most about Racine, more employers (19 of 52) listed employee attitudes than any other factor. Only three employers listed high labor rates. Management's feeling is summarized by William D. Stansil, executive secretary of the Manufacturers' Association: "The complaint is not high wages. Most of our production workers are highly skilled. The real problem in many firms is the lack of productivity behind the high wages."

The report of the Mayor's Committee—on which two labor leaders served—concluded: "While Racine labor is skilled and for this reason high rates paid it can be justified, its productivity in many local factories is low relative to wages paid."

James Rizzo, secretary of UAW Local 553, who served on the Mayor's Committee, says one of the reasons for the apparent low productivity is that many Racine plants have failed to mechanize adequately.

Some manufacturers admit that is true. But they add: Unless the industrial climate can be improved, they may move their operations elsewhere. So they don't want to spend much money modernizing facilities. Result: A productivity decline that feeds on itself.

Some have tried to modernize with unfavorable results. Walker Mfg. Co., for example, installed $45,000 worth of new equipment to improve the rate of production, but the line never got above 75 per cent of anticipated efficiency.

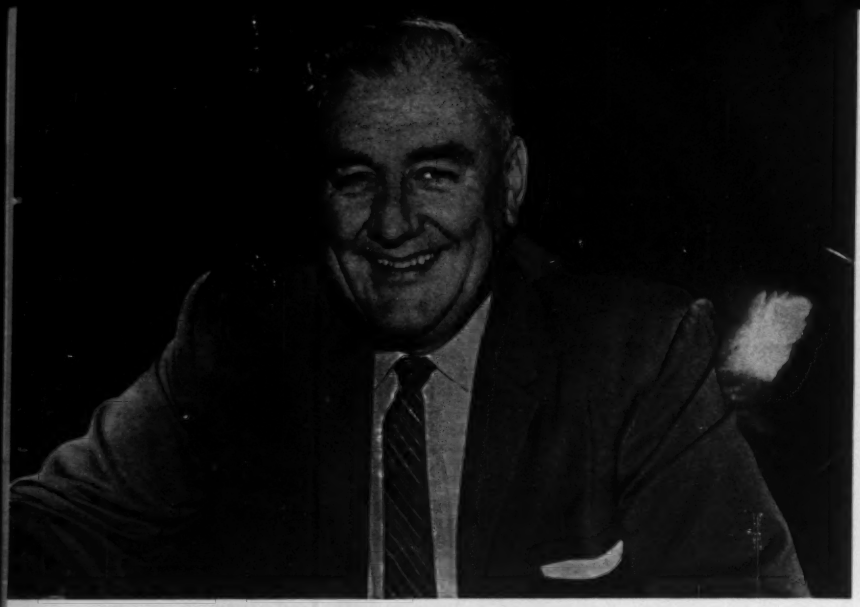
• **Communication**—Alfred Gatzke, president of UAW Local 85, points up another problem: "There is definitely not enough communication between labor and management. They've been too aloof. We must find a way to sit down together and see what we can do to improve plant operations."

Most of the manufacturers agree. The mayor's committee reported: "Management has inadequately informed its employees and the public of its problems." Of 42 manufacturers queried, 39 reported sensing a need for greater economic understanding among employees. That need was dramatized when employees and foremen of one Racine plant were questioned on economics:

- Only 53 per cent believed that consumers influence prices.
- Only 77 per cent thought there should be a direct relationship between individual production and wages paid.
- Only 52 per cent thought profits were necessary.
- 74 per cent thought that if they bought a share of common stock for $100, they could expect an annual dividend of $4 or more; 15 per cent thought they could expect

"A community inventory pinpointed the problems"

John Erskine (left), president, Racine Hydraulics & Machinery Inc., and David Munroe, president, Webster Electric Co., discuss the findings of Racine's "Community Inventory"



"We must tear down the wall of distrust between labor and management"

Rea Hahn, president, Walker Mfg. Co.

a dividend of $10 or more.

• **Toward Improvement** — George Rogers, a consultant who is designing employee communication programs for several Racine companies, declares: "Much of the Racine problem was caused by economic illiteracy. This has resulted in both management and labor officials doing things which time has proved were not in their own best interests. Economic illiteracy is a living, infectious cancer that can grow and feed on itself. It will infect healthy tissue that has not been made immune. Yet it dies quickly whenever it is exposed to the light of economic truth."

• **Teaching Economics**—Mr. Rogers is helping to bring economic understanding to the employees of Twin Disc, Walker, Gorton, and Motor Specialty Ltd. Other Racine firms have indicated they'll attempt like programs.

The Rogers approach is to bring employees together in small groups where they talk economics in everyday language. Discussion leaders range from industrial engineers to union stewards. Each session begins with a film or chart presentation; then the employees discuss the subject. They arrive at their own conclusions based on the facts given by the discussion leader.

With that approach, such subjects as depreciation tax policies, foreign competition, inflation, and the cost-price squeeze can be explained to the employees—who then draw their own conclusions as to what should be done. Each problem is related to the worker's community, his plant, his job.

John Batten, president of Twin Disc, the first firm in Racine to adopt the program, says his purpose is "to develop a continuing flow of economic information as it relates to our company." He thinks the program "gives people the facts they need to make the most intelligent decisions."

Racine Hydraulics & Machinery Inc. has conducted a program called "Selling Is Everybody's Business."

Changing Attitudes

No community's climate can be rebuilt without the backing of the public. That is the challenge to Racine's manufacturers.

Their programs to improve the tax situation and raise employee productivity are two steps toward improving public attitudes.

The Community Inventory was given considerable publicity in the *Racine Journal-Times*, the *Milwaukee Sentinel*, and the *Milwaukee Journal*. The union weekly, *Racine Labor* serialized an objective summary of the town's problems.

The Mayor's Committee represented another positive step, since it got some of the town's thought leaders involved in the problem.

Arnold O. Wolf, president, Hamilton Beach Co., and chairman of the Economic Policy Committee of the Manufacturers' Association, declares: "We now know that the people of our community are vitally interested in the future of Racine industry. We have found that when industrial management honestly appraises its problems and frankly tells the facts, the people will respond to industry's reasonable needs." He adds: "We know we have started a never-ending task—but at least we've started."

Racine's leaders — in management, in labor, in other fields— plan to carry on what they have started. These comments indicate the new enthusiasm:

• ". . . the personal property tax which hits manufacturers' inventories on a given date unduly hard should be eliminated or amended. . ."—*Racine Labor.*

• "There has been a considerable advance in understanding between management and the fellow in the shop. Both sides are maturing. Management is becoming more willing to tell the employee what he needs to know"—Arthur G. Dixon, president, Modine Mfg. Co.

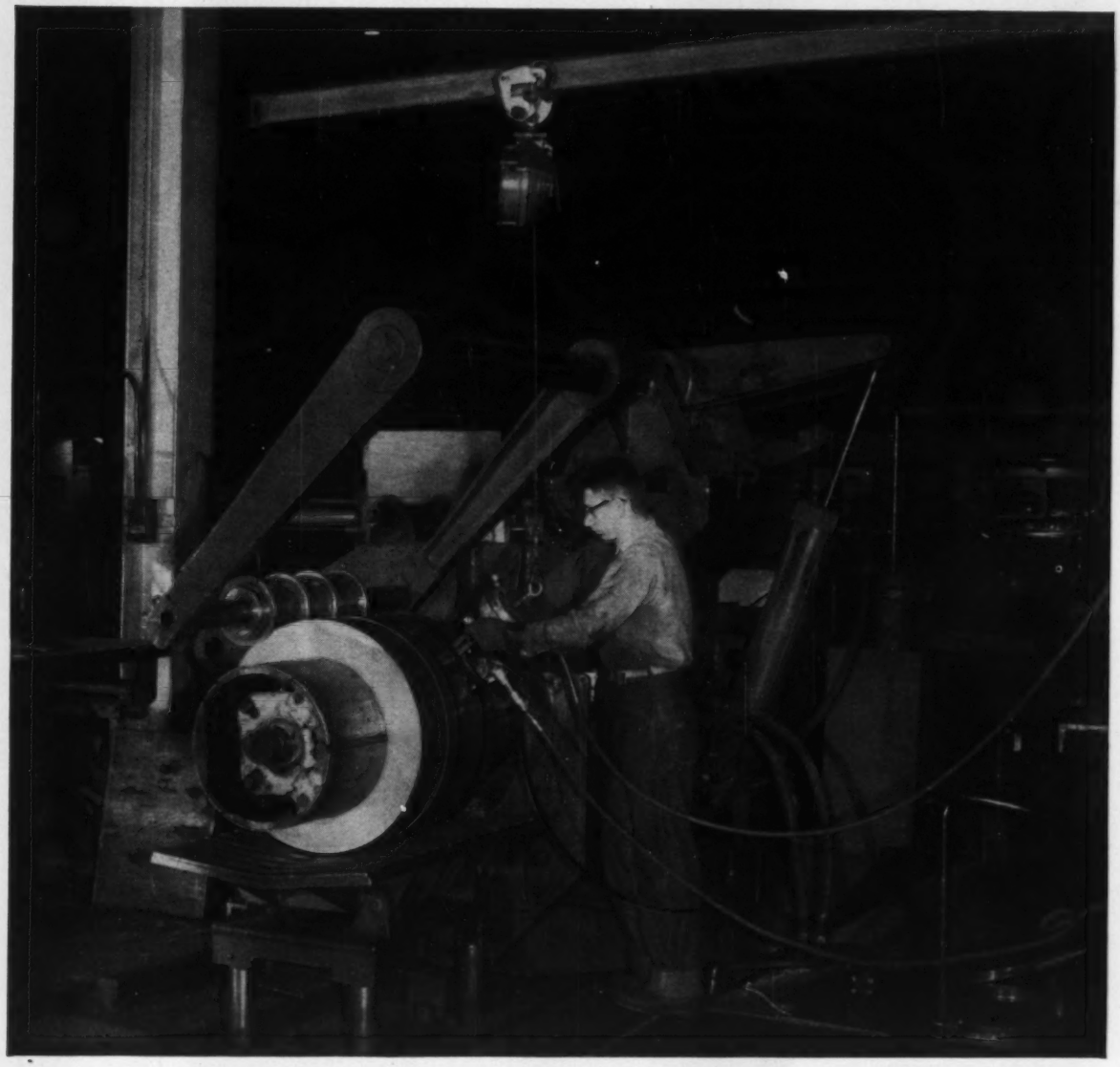
• "The employee realizes that management is not perfect. We've admitted that. We're seeking the employee's help to improve our competitive position. I think this co-operative approach will pay off" —George Gorton III, president, Gorton Machine.

• "We must devote more effort toward getting the townspeople to understand industry's problems and objectives"—David Munroe, president, Webster Electric.

• "Maybe labor should propose its own economic program. . ."—*Racine Labor.*

• "If everyone is willing to co-operate and give their ideas, we'll have competitive companies"—Rea Hahn, president, Walker Mfg. Co.

• "It was a great accomplishment to get our manufacturers to admit that . . . they had to improve their communications with their employees and the community and participate more effectively in politics"—Mr. Stansil.



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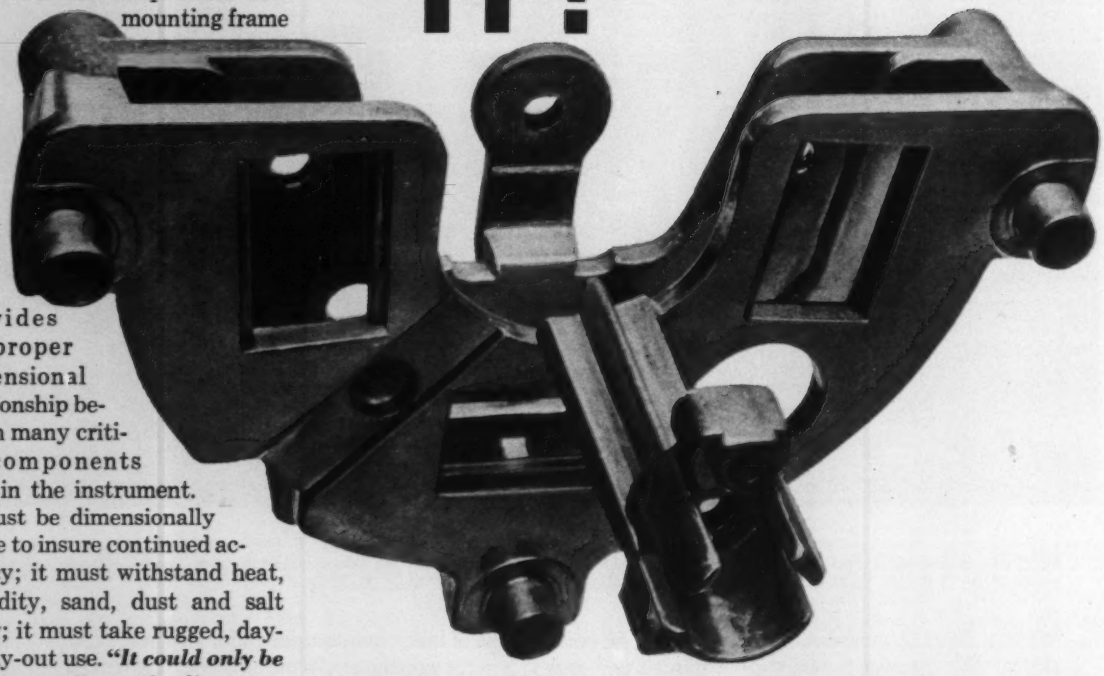
These are some of the *cast* tolerances on this complex mounting frame. GE design engineers specified Zamak—"because of the close tolerances we needed and could get...***without machining.***"

Close tolerances are only one reason Zamak was specified. This mounting frame provides the proper dimensional relationship between many critical components used in the instrument. It must be dimensionally stable to insure continued accuracy; it must withstand heat, humidity, sand, dust and salt spray; it must take rugged, day-in, day-out use. ***"It could only be done in zinc,"*** says the die caster, Peasley Products, Inc.



Cost? The answer from GE design engineers: "This die casting has permitted us to supply the market with an instrument whose performance is equal to, or better than, previous designs, and at the same time has reduced cost through greatly reduced machining operations."

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HORSE HEAD PRODUCTS

Olds Strives for Reliability Image

PRELIMINARY reports indicate that General Motors Corp.'s Oldsmobile Div. will wind up in seventh place in the 1960 calendar year production race with about 6 per cent of the market. That is one rank lower than the division stood in 1959 when it took 6.5 per cent of production. Reason: Dodge's Dart has become such a hot item that this Chrysler line moved up from eighth to fourth place in 1960, ahead of Rambler and Pontiac as well as Olds.

Olds still maintains third place in the medium priced group. It expects to show a sizable sales boost in 1961 because of its smaller F-85. Olds has already produced 106,255 regular sized 1961 models and 39,931 F-85s. Jack F. Wolfram, general manager, asserts that the division no longer is hedged in by price class. He anticipates that the F-85 will be mostly "plus" business.

• **New Look**—Actually, Oldsmobile is in the process of changing its image to hold repeat buyers whose loyalty reportedly accounts for better than 80 per cent of its sales. The division formerly was known as GM's "experimental" carbuilder, pioneering styling and engineering changes. Now, Mr. Wolfram wants to maintain a classic styling concept and create a new image as the "reliability" car in GM's stable. Each department and section in the division is being charged with specific responsibilities that will lead to a more dependable automobile from the buyer's standpoint. Example: The Advance Design Engineering Dept.

• **Works Ahead**—The department was organized in 1956. It's under the direction of Andrew K. Watt who reports directly to H. N. Metzel, chief engineer. Advance Design has the job of checking out new model concepts before they are released for final production engineering. It also develops new components for upcoming cars. Says Mr. Watt: "By analyzing designs more thoroughly before they're committed for production, we help shortstop many design and production problems that formerly cost time, money, and sometimes customers. Since we no longer have to spend so much time solving current problems, we have more opportunity to develop new items for the car."

Among the accessories Advance Design has "sold" to the division is a swiveled reading light that's optional equipment on all regular sized cars this year. It also originated the 1961 Hydra-Matic which is 70 lb lighter than the older automatic transmission. Its smaller diameter has cut tunnel height by one-third.

Mr. Watt's department also carries out a material evaluation program. He suggests that magnesium may gain wider use as its price is brought more in line with that of aluminum (Dow Chemical Co. already offers competitive pricing deals on its diecasting alloys).

Oldsmobile has also done some experimental work with high strength-low alloy steels. In time, these newer steels could save weight and cost on some parts. Example: A fender baffle now made from a double layer of low carbon steel. "If we could use a higher strength material we might be able to cut the

DIVISION'S MARKETING HISTORY

(Thousands of units)

	Production	Registrations	Share of Domestic Production
1960*	406.0	361.0	6.10%
1959	366.3	360.0	6.55%
1958	310.8	306.5	7.32%
1957	390.1	371.6	6.38%
1956	432.9	437.9	7.46%

*Preliminary. Adapted from Ward's Automotive Reports.

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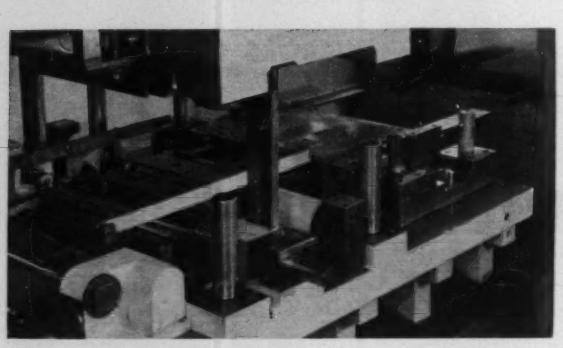

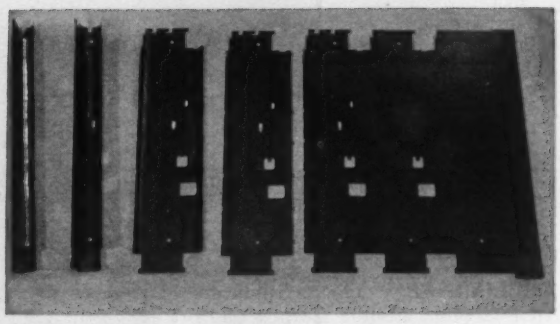

Oldsmobile Stamps Out Steering Jacket Columns

INSTEAD OF MAKING a welded tube and then piercing it, General Motors Corp.'s Oldsmobile Div., Lansing, Mich., punches holes and notches into a flat blank, curls it into tube shape, and fastens it with six interlocking tabs and a single spotweld. That makes for a 45 per cent cost saving over the tube forming process. The method was originated by Koppy Tool & Die Co., Ferndale, Mich., which designed and built the progressive die. Olds uses it to make jacket columns for F-85s and Buick Specials. Similar parts for its larger cars are bought from GM's Saginaw Steering Gear Div.

Slit coils of SAE 1010 steel, 0.050 in. thick and 29.09 in. wide, are used for the jacket. The wider coils are less expensive than the narrow strip formerly needed for tubing stock. About 4500 pieces can be blanked out of each coil at a rate of 700 an hour. Two men handle the operation. The only scrap is a ⅛ in. edge trimming and the hole centers. The finished part is 28 in. long and has a 2.38 in. OD. It's held to an in-round tolerance of 0.005 in. Five lanced tabs, 15 holes, and four end notches are pierced or punched into each jacket.

● Process—Coil stock is fed through a rack and pinion feeder and into an 800 ton Verson press where the edge is trimmed to width and holes and notches punched out in a single stroke. A 7.35 in. blank is cut off with the second stroke which also punches out the locking tabs.

The column blank is carried along to the next die station where it gets its first form. Another stroke curls it. For the final forming, the part moves to the last die station where stub mandrels are cammed out into each end of the half round tube. When the press comes down, the tube is formed into final shape. The lock tabs, which have been squeezed together, are spread out into a rabbit ear shape as they are forced into notches on the mating edge of the tube.

When the die opens, the mandrels are withdrawn, the part is picked up by a transfer device and ejected from the press. A single spotweld is made on the upper end of the jacket column.

● Adaptations—Two changes have been made on the original Koppy method. The stub mandrels replace a single, full length mandrel. It's no longer necessary to push the finished part off the mandrel and out the side of the press.

The engineers also added a 1:1 power takeoff operating from the coil feeder. The feeder itself pushes the steel through the trim, pierce, and cutoff operations.

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gage and make one layer do the job instead of two.

● **Saves Time**—Possibly the greatest timesaver in the department is its recently formed Computer Section. The computers simulate proving ground tests, giving designers performance predictions so they can quickly make corrections and design changes in car components. "With a computer we can make our tests any time; we always have a constant base on which to judge performance."

As an example of its efficiency, Mr. Watt points to an engine performance test on a 215 cu in. engine in the F-85 car. The computer data show the engine will pull the car from zero to 60 mph in 13.54 seconds. "Now suppose we want to 'soup up' this engine to a 231 cu in. job by increasing compression ratio to 10:1, add a four barrel carburetor and dual exhausts. What kind of performance can we expect?" he asks. Normally, the division would have to build a couple of engines and run a dozen or more proving ground tests, but the computer changes that. "All we do is feed the data into the computer and we quickly find the redesigned engine will go from zero to 60 mph in 11.09 seconds. Our results will be as accurate as the information the engineers have given us for programing," reports Mr. Watt.

Eventually, he hopes to develop enough information so the computer can be used for economy tests. "This will be a more reliable and quicker way of measuring fuel economy than any of the methods we have to use now," he says.

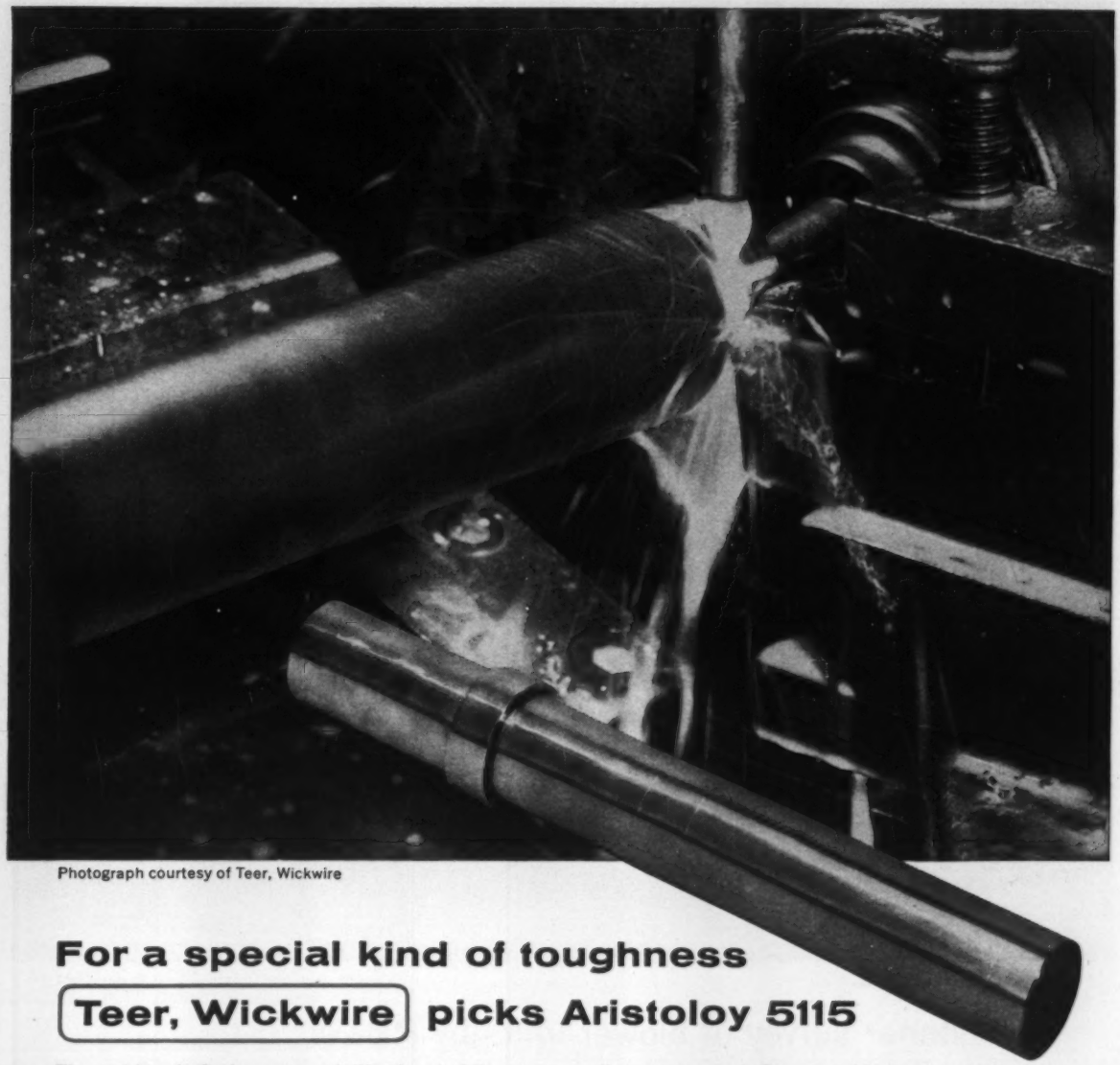
U. S. Auto Output

Passenger Only

	1960	1959
January	688,731	545,756
February	659,323	478,518
March	654,242	576,080
April	582,909	578,846
May	611,226	546,817
June	613,147	557,995
July	434,377	555,410
August	305,527	239,152
September	407,685	258,151
October	617,816	507,527
November	597,132	254,527
December	522,000†	494,931
Totals	6,694,115†	5,593,707

Week Ended	1960	1959
Dec. 3	135,348	55,337
Dec. 10	135,328	86,566
Dec. 17	130,711	152,449
Dec. 24	114,941	103,219
Dec. 31	87,564†	112,113
	1961	1960
Jan. 7	80,000*	163,249

Source: *Ward's Automotive Reports.*
†Preliminary. *Estimated by STEEL.



Photograph courtesy of Teer, Wickwire

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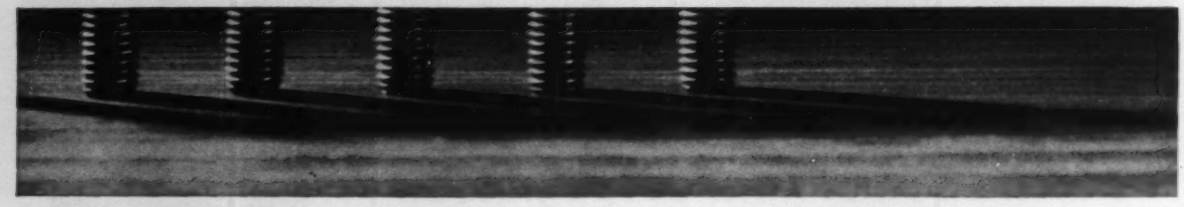


Fastener survey of blower units by RB&W points out where use of standard hex screws cuts costs, but not quality

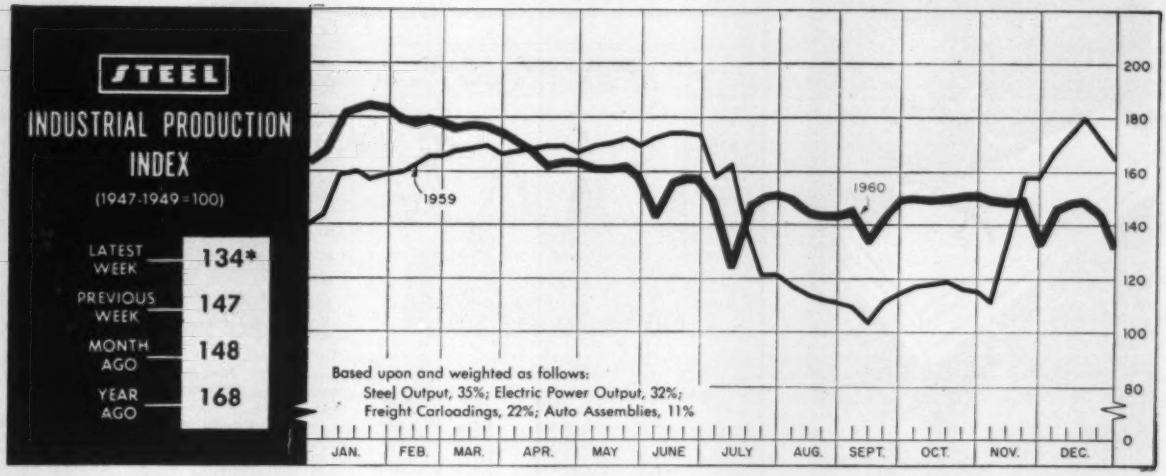
In making a survey of a well-known manufacturer's fastening operations, the RB&W man found that alloy socket head screws were used extensively in large blower units.

But he found no genuine engineering need – the alloy's strength wasn't being utilized. And he found no production need – there was no tight spacing situation that required internal wrenching. Nor was there even an *appearance* need – screws weren't being installed in countersunk holes for a flush fit.

So there was no purchasing need, either. Why pay the premium cost for alloy fasteners? He recommended switching to *standard* high strength hex screws. The savings in fasteners per blower: 50 dollars. That's 50 dollars added to unit *profit* with no increase in price.

An RB&W Fastener Expert is no better than your engineers. He simply knows *what* to look for. Why not let him search for savings with one of *your* engineers? Maybe you're doing the best possible; but unless you're sure you're not wasting fastener dollars, it pays to consult Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N. Y.

Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. **Sales office and warehouse at:** San Francisco, Calif. **Sales offices at:** Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas. **Sales agents at:** Cleveland; Milwaukee; New Orleans; Denver; Fargo. **Distributors coast to coast.**



*Week ended Dec. 31.

'61 Will Be Year of Expansion

EARLY 1961 bears few if any of the earmarks of an expansion year. Yet the prognosticators say that is what it is going to be. If they are right, this will be the third consecutive year in which the general economy has moved ahead—about par for the post-World War II period.

Only once since 1946 has either gross national product or the Federal Reserve Board's industrial production index increased more than three years in a row—that was 1951 through 1953, under the influence of the Korean War. The apparent mildness of the current recession plus the probability that it will be divided fairly evenly between 1960 and 1961 holds out the possibility that the expansion string may run for several more years.

● **Pickup Coming**—Most of the forecasts for 1961—both the general and industry types—are based on the premise that a recovery will be underway about midyear. Typical is the outlook of purchasing agents. Nearly half the reporting members of the Business Survey Committee of the National Association of Purchasing Agents expect 1961 to be better than 1960. Only 13 per cent see it as being worse. But 23 per cent see a further deterioration in the first quarter, while only 17 per cent see a betterment. Taking the first six months of 1961, compared with the last six months of last year, 31 per cent see improvement. This indicates buyers see a progressive improvement this year once the low point of the first quarter is passed.

Members of a National Industrial Conference Board economic panel cite the strength of end product demand and continued high confidence of businessmen as the causes of a midyear upturn which will carry GNP to an annual rate of about $518 billion by the fourth quarter. (It was about $500 billion at the turn of this year.)

A survey of 120 credit and financial executives by the National As-

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)	1,300[1]	1,103	2,715
Electric Power Distributed (million kw-hr)	14,100[1]	15,114	13,425
Bituminous Coal Output (1000 tons)	7,560[1]	7,260	6,984
Crude Oil Production (daily avg—1000 bbl)	7,100[1]	7,139	7,068
Construction Volume (*ENR*—millions)	$299.5	$443.9	$191.0
Auto, Truck Output—U. S., Canada (*Ward's*)	110,218[1]	141,626	165,011
TRADE			
Freight Carloadings (1000 cars)	500[1]	468	483
Intercity Truck Tonnage (changes from year ago)	+18.6%	−15.2%	+7.5%
Business Failures (Dun & Bradstreet)	253	351	195
Currency in Circulation (millions)[2]	$33,195	$33,174	$32,893
Dept. Store Sales (changes from year ago)[2]	+30%	−4%	+20%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$25,362	$32,302	$22,280
Federal Gross Debt (billions)	$290.7	$290.6	$291.1
Bond Volume, NYSE (millions)	$26.7	$32.2	$31.1
Stocks Sales, NYSE (thousands of shares)	16,537	18,425	13,343
Loans & Investments (billions, adjusted)[3]	$110.4	$108.5	$104.9
U. S. Govt. Obligations Held (billions)[3]	$29.8	$29.7	$27.5
PRICES			
STEEL's Finished Steel Price Index[4]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[5]	215.8	215.9	232.2
All Commodities[6]	119.5[1]	119.5	118.8
Commodities Other than Farm & Foods[6]	127.9[1]	127.9	128.5

*Dates on request. [1]Preliminary. [2]Federal Reserve Board. [3]Member Banks, Federal Reserve System. [4]1935-39=100. [5]1936-39=100. [6]Bureau of Labor Statistics Index, 1947-49=100.

CUSTOMER REPORTS

246 ORDERS RECEIVED / 000 ORDERS REJECTED

An electrical components manufacturer, with exacting material requirements, received 246 orders from BRMCO last year . . . without rejecting a single pound of material.

This example, typical of BRMCO's service to all customers, points out BRMCO's ability to produce and deliver strip aluminum, brass, and bronze to meet the most rigid specifications . . . every time, on time. It also indicates the value of BRMCO's custom packaging, which protects the metal from damage, besides economizing on storage space and making in-plant handling easier.

Check into the many advantages of specifying BRMCO Strip . . . not the least of which are "Specific-Date" delivery and reduced material costs.

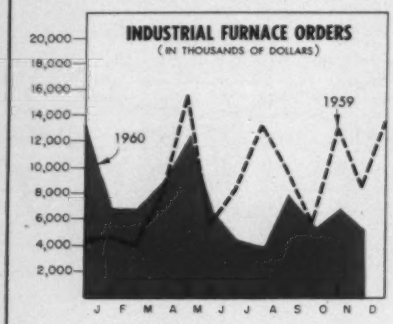
Write or phone today, without obligation. If you phone, call EDison 7-4434 (Bridgeport—collect) and ask for Larry Hayden, field service department.

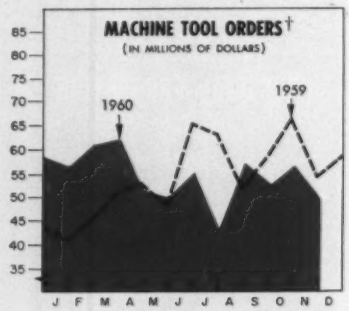
FINE QUALITY ALUMINUM, BRASS AND BRONZE IN STRIP AND ROLLS

BRMCO

Bridgeport Rolling Mills Company
BRIDGEPORT, CONNECTICUT
Subsidiary of
ATCO CHEMICAL-INDUSTRIAL PRODUCTS, INC.

THE BUSINESS TREND





	1960	1959	1958*
Jan.	6,827	4,545	3,047
Feb.	6,784	3,596	3,684
Mar.	9,033	7,842	2,871
Apr.	12,464	15,517	3,572
May	6,352	5,315	954
June	4,340	8,230	3,672
July	3,966	13,141	5,169
Aug.	7,840	9,738	3,533
Sept.	5,253	5,560	4,846
Oct.	6,634	12,967	3,105
Nov.	5,084	8,442	5,597
Dec.	....	13,437	4,284

*Does not include industrial ovens. Industrial Heating Equipment Assn. Inc.

Charts copyright, 1961, STEEL.

	New Orders (000 omitted)		Shipments (000 omitted)	
	1960	1959	1960	1959
Jan.	$56,450	$41,050	$46,400	$31,300
Feb.	60,600	45,400	51,950	38,050
Mar.	61,950	51,550	64,500	45,750
Apr.	51,950	53,200	55,100	45,000
May	49,950	48,700	56,350	41,000
June	55,100	65,400	63,100	50,050
July	42,950	63,400	51,300	40,600
Aug.	56,850	52,200	47,900	40,300
Sept.	52,300	58,850	53,950	46,150
Oct.	56,200	66,650	51,350	51,500
Nov.	49,650*	54,250	48,050*	46,600
Dec.	.....	58,300	.....	63,850
Totals	.....	$658,950	.....	$538,150

†Cutting and forming. *Preliminary. National Machine Tool Builders' Assn.

sociation of Credit Management says that the FRB index will climb back to 110 (1957=100) by July—approximately equal to the all-time record early in 1960.

The National Securities & Research Corp., New York, says the current downtrend will be reversed because of: 1. Rising government expenditures. 2. Consumer outlays for nondurable goods and services. 3. A strong rise in construction.

Against that background, here is how some selected metalworking industries will fare in 1961:

● **Farm Equipment**—Sales should top 1960's by 15 per cent, declares Merritt D. Hill, vice president and general manager, Ford Motor Co.'s Tractor & Implement Div. Farm income is on the uptrend, and dealers' inventories have been worked off, he states.

● **Textile Machinery**—Backlogs indicate a high rate of operations in the next six months, but curtailments in the last half may cut the 1961 total 10 to 15 per cent beneath last year's, which was a ten year record, says the Business & Defense Services Administration.

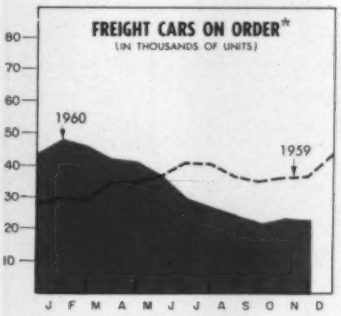
● **Pressure Pipe**—Shipments of cast iron pressure pipe and fittings will be a little better than 1.3 million tons, up 1 per cent from last year's, BDSA estimates. Government sponsored urban redevelopment will be the stimulating factor.

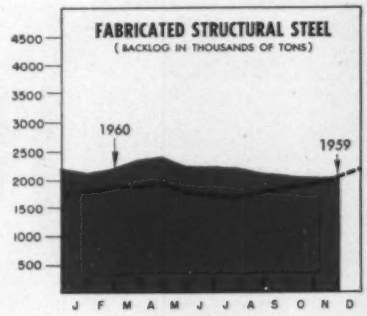
● **Material Handling Equipment**—Production in 1960 was off the '59 pace by about 5 per cent, and BDSA sees a continuation of that trend in the first half. But the last half will see an upturn of 10 per cent or more, it forecasts.

● **Construction**—After a disappointing 1960, construction will be back on the track to a record total of $76.8 billion this year, declares Associated General Contractors of America Inc. That's 3.5 per cent above last year's total. The breakdown: $57.275 billion for new construction and $19.5 billion for maintenance and repair.

● **Instrumentation**—After setting a record last year, this industry can look forward to another one this year, states James S. Locke, vice president of Minneapolis-Honeywell Regulator Co.

● **Tool and Diemakers**—Shipments last year were about 10 per cent





	Domestic Awards		Backlogs (end of month)	
	1960	1959	1960	1959
Jan.	7,149	4,102	48,170	29,470
Feb.	3,411	1,842	46,323	28,789
Mar.	1,959	10,782	42,131	35,487
Apr.	5,551	3,736	41,003	35,479
May	2,234	5,253	36,106	36,869
June	321	8,369	29,555	40,973
July	1,306	4,159	26,658	40,309
Aug.	1,343	1,653	23,866	37,172
Sept.	2,061	943	21,662	35,626
Oct.	5,885	2,722	22,900	36,199
Nov.	3,680	2,424	22,781	36,555
Dec.	....	10,560	.....	43,870
Total	....	56,495		

*Domestic only.
American Railway Car Institute.

	Shipments		Backlogs	
	1960	1959	1960	1959
Jan.	209.0	224.3	2,116	1,794
Feb.	240.9	216.1	2,189	1,864
Mar.	277.0	260.5	2,364	1,873
Apr.	286.9	290.6	2,401	1,922
May	284.6	294.1	2,237	1,768
June	332.7	365.4	2,219	1,717
July	301.2	238.6	2,203	1,679
Aug.	331 9	220.4	2,114	1,772
Sept.	323.5	182.6	2,058	1,871
Oct.	313.6	195.3	2,028	1,891
Nov.	288.7	180.8	2,016	2,068
Dec.	....	235.7	....	2,195
Total	....	2,904.4		

American Institute of Steel Construction.

above 1959's, reports the National Tool, Die & Precision Machine Association. But unfilled orders and new orders have been sluggish since late fall, indicating a lower level of operations for 1961.

• **Warm Air Furnaces**—BDSA sees shipments of about 1.7 million units in 1961, approximately the same as in 1960. This is assuming an uptrend in housing starts in the second half. However, a survey by the Gas Appliance Manufacturers Association indicates an upturn of 12.2 per cent in gas central heating equipment sales.

• **Appliances**—Herman F. Lehman, general manager of Frigidaire Div. of General Motors Corp., believes that 1960 was a better than average appliance year and that the same trend will prevail in 1961. Causes: 1. Consumer acceptance of newer type growth appliances. 2. Replacement market for such large production items as refrigerators.

GAMA forecasts these 1961 trends for selected gas appliances:

Gas ranges	up 14.8%
Water heaters	up 6.0%
Incinerators	up 9.2%

The National Electrical Manufacturers' Association sees these trends in electrical appliances (factory shipments):

Refrigerators	up 0.7%
Home freezers	up 5.3%
Ranges	up 4.9%
Water heaters	down 2.1%
Dishwashers	up 12.6%
Food waste disposers	up 7.9%
Dehumidifiers	up 15.9%

• **Electrical Goods** — NEMA also forecasts 1961 trends for these products of the electrical manufacturing industry:

Consumer products	up 2.5%
Lighting equipment	no change
Industrial electronics & communications equipment	up 2.5%
Industrial equipment	down 2%
Building equipment	down 2%
Insulating materials	up 5%
Wire and cable	no change
Generating, transmission & distribution equipment	down 3.5%

NEMA reports factory sales last year were at an all-time high of $22.6 billion. They could rise to $22.8 billion this year or drop off 5 per cent, depending on the general business climate.

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*temperature indicating crayons**

*Also Tempil° Pellets and Tempilaq° (liquid form)

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JAMES R. KERR
Avco president

GEORGE HAZELZET
Connecticut Broach exec. v. p.

E. F. ANDREWS
Allegheny Ludlum v. p.

FLETCHER L. BYROM
president of Koppers

James R. Kerr was elected president of **Avco Corp.**, New York. Former executive vice president, he succeeds **Kendrick R. Wilson Jr.** who was elected chairman and chief executive officer to succeed the late **Victor Emanuel. Col. Earl H. Blaik**, a vice president, was elected chairman of the executive committee.

George Hazelzet was named executive vice president and general manager of **Connecticut Broach & Machine Co.**, New London, Conn.

Francis H. Gerlach was appointed vice president-engineering, **Porter-Cable Machine Co.**, Syracuse, N. Y. He was president and general manager of Han-Kor Co., Cleveland. **John W. Graham**, acting director of engineering, was made director of engineering research, devoting full time to new product investigation for the Portable Electric Tool Div. and the Gasoline Products Div. of Porter-Cable.

E. F. Andrews was elected vice president - purchases, **Allegheny Ludlum Steel Corp.**, Pittsburgh. He succeeds **Lester H. Bittner**, retired. Mr. Andrews was director of purchases.

Harold Wolpman was made senior vice president, a new post at **Grove Valve & Regulator Co.**, Oakland, Calif. He is in charge of plant engineering, plant structures, and new plant locations. **Walter L. Connolly** was made vice president-manufacturing.

Howard E. Miller was appointed chief metallurgist of **Republic Steel Corp.'s** Cleveland district steel plant. Former assistant chief metallurgist, he succeeds the late **H. L. Farling. C. J. Schaefer** was named to succeed Mr. Miller.

Everett M. Mason was appointed purchasing agent of **Emcor Ingersoll Products Div.**, Elgin, Ill., Borg-Warner Corp. He has been a buyer.

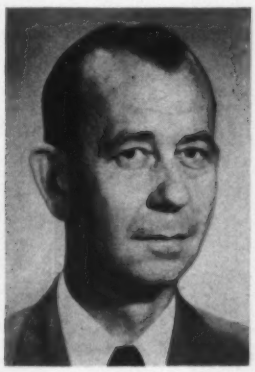
Fletcher L. Byrom was elected president of **Koppers Co. Inc.**, Pittsburgh. Mr. Byrom, who was vice president-general manager, Tar Products Div., will be chief administrative officer. **Fred C. Foy**, who held the dual position of chairman and president, continues to serve as chairman and chief executive officer.

David J. Champion was appointed vice president, **Champion Rivet Co.**, Cleveland. He was sales manager. **Joseph A. Diemer** was made assistant to the president. He was plant manager.

Ernest L. Anderson Jr., former director of purchases, Brown & Sharpe Mfg. Co., was appointed director of purchasing for **Carborundum Co.**, Niagara Falls, N. Y.

Sidney A. Shuman was elected vice president-general manager, **National Supply Div.**, Pittsburgh, Armco Steel Corp. He succeeds **A. W.**

FRANCIS H. GERLACH
Porter-Cable eng. v. p.



HOWARD E. MILLER
Republic Steel metallurgist

EVERETT M. MASON
Emcor Ingersoll p. a.

SIDNEY A. SHUMAN
heads Armco Nat'l Supply Div.

JAMES H. BUTLER
vice president of Binkley

DAN L. McGURK
TRW Computers marketing

JOHN L. THOMAN
J&L div. plant mgr.

EDWARD C. MANIX
Quaker State Metals post

McKinney, who recently retired as head of National Supply.

James H. Butler was elected vice president - manufacturing, **Binkley Co.**, Warrenton, Mo. He resigned from Allied Metals Co., where he was plant manager.

Glenn A. Wilson was appointed vice president-purchases and special projects, **Firth Sterling Inc.**, Pittsburgh. He continues as vice president-general manager of Strategic Metals Corp., and as vice president of Borolite Corp., subsidiaries.

Horace R. Riggs was elected a vice president of **Crane Co.**, with headquarters in Chicago. Prior to becoming general manager of Crane Supply Co., he headed branches in Pittsburgh and in Lima, Ohio.

Burton F. Drill was made director of marketing for **Schaevitz Engineering** and its subsidiaries, Pennsauken, N. J. He rejoins Schaevitz, having previously been its sales manager.

Dan L. McGurk was named director of marketing for **TRW Computers Co.**, Beverly Hills, Calif., division of Thompson Ramo Wooldridge Inc. He was sales manager.

John L. Thoman was appointed manager of operations at the Kenilworth, N. J., plant of **Jones & Laughlin Steel Corp.'s** Stainless & Strip Div. He is succeeded as division industrial engineer, Detroit, by **Jerome Brown.**

Arthur G. Witt was made general sales manager, Cleveland Div., **Precision Castings Co.**

Walther H. Feldmann, president, was elected chief executive officer of **Worthington Corp.**, Harrison, N. J. He succeeds **Hobart C. Ramsey,** who continues as chairman.

Arnold R. McLain was appointed general manager, **Yuba Heat Transfer Div.**, Honesdale, Pa., Yuba Consolidated Industries Inc. He was with Combustion Engineering Inc.

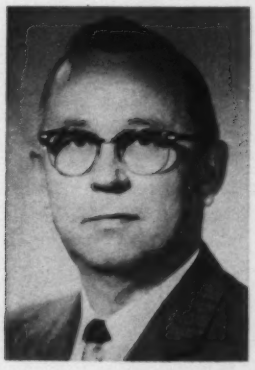
Edward C. Manix was made vice president and general sales manager, **Quaker State Metals Co.**, Lancaster, Pa., division of Howe Sound Co. He was vice president-general manager with Nichols Wire & Aluminum Co., Davenport, Iowa.

Union Spring & Mfg. Co., New Kensington, Pa. (under new management) elected **Clarence Abitz** president; **Bernard C. Sabel** and **John S. Moeller,** vice presidents. **William McCabe,** with Union Spring for 54 years, is now president emeritus and member of the advisory committee. **Leo Duffy,** former vice president of Youngstown Steel Door Co., was made director of sales.

Norman J. Vang was elected vice president-manufacturing for **Corhart Refractories Co.**, Louisville. **Donald W. Shoemaker** was made manager of manufacturing services. Mr. Vang was assistant to the staff vice president of Corning Glass Works, parent company. Mr.

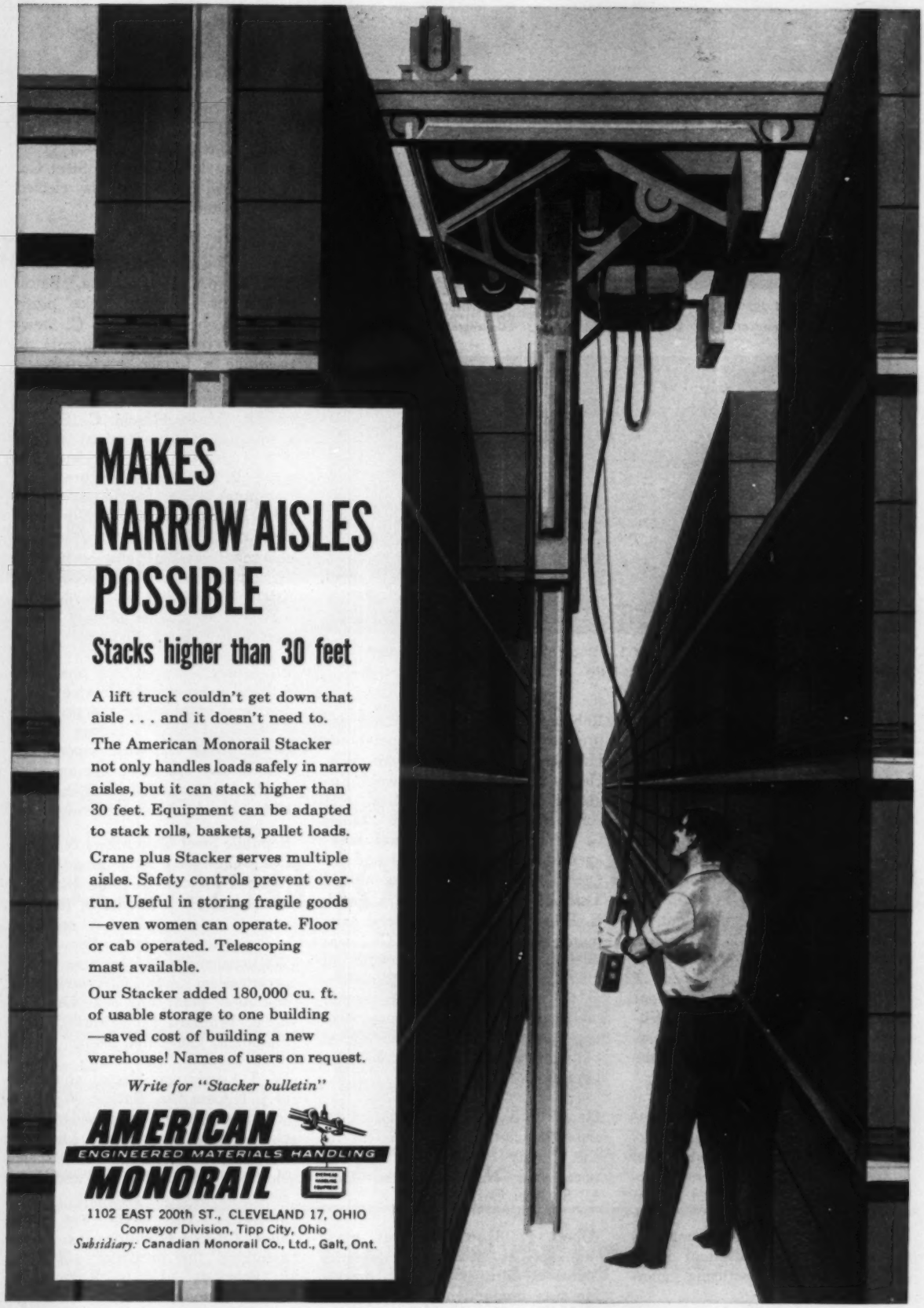
HORACE R. RIGGS
Crane vice president

BURTON F. DRILL
Schaevitz Eng. marketing dir.



ARNOLD R. McLAIN
Yuba Heat Transfer gen. mgr.

NORMAN J. VANG
Corhart v. p.-manufacturing



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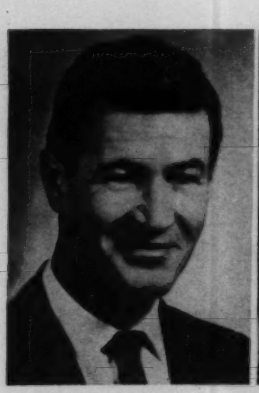


CHARLES A. VOLZ JR.
Olympic Products president

WALTER GREGG
Crucible Steel v. p.

KENNETH S. BAYLESS
Cal-Metal Pipe exec. v. p.

LOGAN MONROE
Eaton Mfg. adm.- v. p.

STACY L. ANGLE
Minneapolis-Moline exec.

ROBERT C. JAMES
Hayssen v. p.-operations

Shoemaker was manager of manufacturing for Corhart.

Logan Monroe, former vice president and controller, was elected a vice president - administrative of **Eaton Mfg. Co.**, Cleveland. **Hugh McKibbin** was promoted from assistant controller to controller.

Stacy L. Angle, vice president of **Minneapolis-Moline Co.**, Hopkins, Minn., was named senior vice president. He also holds the post of president of Pioneer Equipment Finance Co., a subsidiary. **William F. Foss**, vice president-treasurer, was elected chairman of the operating committee for 1961.

Jerry Grott, manufacturing manager, **WaiMet Alloys Co.**, Dearborn, Mich., assumes additional duties as technical manager, replacing **Bill James** who resigned to join Centrifugal Casting Co., Long Beach, Calif. **John Fritz**, materials manager, assumes additional duties as assistant manufacturing manager.

Robert C. James was appointed vice president in charge of operations, **Hayssen Mfg. Co.**, Sheboyan, Wis. He was president of Griswold Engineering Ltd., Toronto, Ont., and continues as its chairman. **James C. Johnston**, former general manager for Hayssen domestic and international operations, was named assistant to the president. **Frank E. Pringle Jr.**, former general sales manager of Howe Scale Co., was made general sales manager of Hayssen domestic and international sales. **Robert F. Black**, former manager of manufacturing services for Emhart Mfg. Co., was named plant manager of the Sheboygan plant.

Harry A. Siefen was appointed assistant general superintendent of the Christy Park Works, McKeesport, Pa., **National Tube Div.**, U. S. Steel Corp.

Albert P. Skowronek was made manager of production, **Superior Valve & Fittings Co.**, Pittsburgh. He was production co-ordinator.

Charles A. Volz Jr. was elected president of **Olympic Products Co. Inc.**, Alpha, N. J. Former vice president-general manager, he succeeds **Joseph B. Schaefer**, now chairman.

Walter Gregg, former vice president-technology, **Crucible Steel Co. of America**, Pittsburgh, was elected vice president-operations.

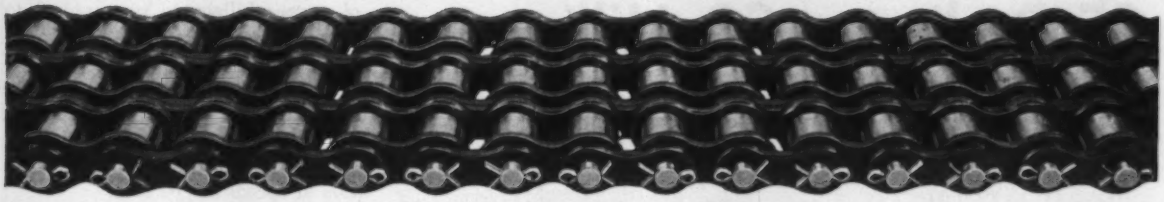
Kenneth S. Bayless was elected executive vice president of **Cal-Metal Pipe Corp. of Louisiana**, Baton Rouge, La. Formerly vice president-sales, he succeeds **R. C. Stewart**, who returns to California to reassume a former association.

Aluminum Co. of America, Pittsburgh, elected **Harold C. Erskine** (vice president-production) to the post of executive vice president; **Edward B. Wilber** (vice president-treasurer) vice president-finance; **John D. Harper** (assistant production manager) vice president in charge of smelting and fabricating divisions; **George W. Streepey** (assistant production manager) vice president in charge of raw materials and refining divisions.

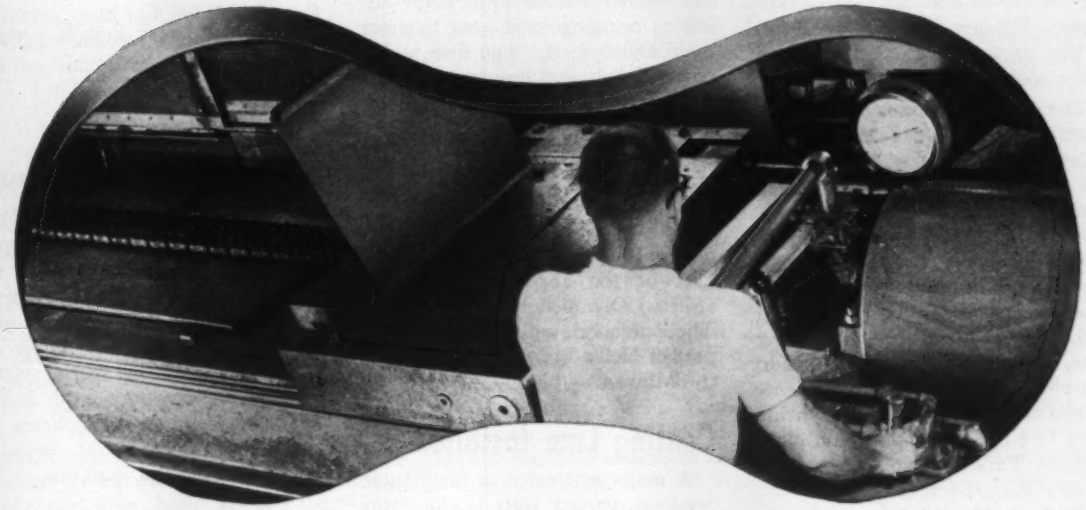
W. Ashley Gray Jr., vice president-railroad sales, was made vice president and assistant to the president of **General Steel Castings Corp.**, Granite City, Ill., with responsibilities at the executive management level. He is assisted by **Richard L. Lich** as assistant vice president.

Republic Steel Corp., Steel & Tubes Div., Cleveland, appointed **C. H. Johnson** assistant division manager to succeed **H. J. Meyfarth**, recently named assistant division manager of Republic's Bolt & Nut Div. **C. W. Wight** succeeds Mr. Johnson as superintendent of the Cleveland steel and tubes plant, and is replaced by **L. L. Brainard** as assistant superintendent, Cleveland plant.

W. J. Grede was elected chairman of **J. I. Case Co.**, Racine, Wis. He continues to serve as president and chief executive officer. **John T. Brown**, resigned chairman, was elected vice chairman, and will serve as special assistant to the president. Mr. Grede was president of Grede Foundries Inc. before assuming the presidency of Case in February. He is chairman of Grede Foundries.



Here's
another of the
invisible extras that
insure the precision performance
of LINK-BELT roller chain

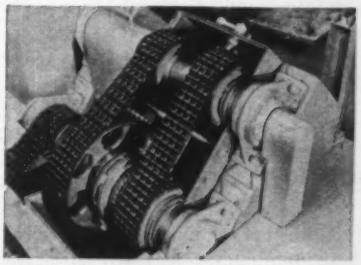


prestressing of multiple-strand chain guarantees

uniform load distribution

Unless each strand carries its full share of the load, multiple-strand roller chain may fail. That's why Link-Belt's prestressing is so vital. Prestressing seats and cold-works the chain joint parts . . . assures equal load distribution across the chain, reduced elongation in service.

Prestressing is just one of many *invisible extras* that contribute to the greater strength and endurance of Link-Belt roller chain. Others include precise heat-treat control, pitch-hole preparation, shot-peening and burnishing of rollers. These features—plus painstaking precision and inspection in every step of manufacture—assure you of chain that can easily cope with today's heavy loads and high speeds.



Quadruple-strand Link-Belt roller chain drives are used on this two-speed transmission. High speeds on short centers are easily handled.

For engineering assistance in applying industry's preferred roller chain, contact your nearest Link-Belt office or authorized stock-carrying distributor. Look under chains in the yellow pages of your local telephone directory. Ask for Book 2657.

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LINK-BELT

ROLLER CHAINS AND SPROCKETS

GE Dedicates $8 Million Industrial Center Plant

GENERAL ELECTRIC CO., Schenectady, N. Y., has dedicated its 465,000 sq ft engineering and manufacturing facility at Geddes (Syracuse), N. Y. Cost of plant, including equipment: About $8 million.

The plant will be used primarily for the design, development, production, and testing of radar and underwater detection equipment being manufactured by the firm's Heavy Military Electronics Dept. for the Army, Navy, Air Force, and major defense contractors.

The Syracuse Industrial Center Plant consists of two large buildings which are being occupied by the company under terms of a long term lease. Building No. 1, including 159,000 sq ft of office and laboratory space, has been completed and is partially occupied. The second building, containing 306,000 sq ft of manufacturing area, is scheduled for completion in March. It will house the defense production work currently being done in GE's Thompson Road plant and in Building No. 7 at Electronics Park, Syracuse.

When relocations planned over the next few months are complete, Heavy Military Electronics Dept. operations will be located at the Court Street plant, which includes nine buildings housing office, laboratory, manufacturing and test areas, and is the department's headquarters; Syracuse Industrial Center; Electronics Park; one building in DeWitt, N. Y.; the Fazio Building in Liverpool, N. Y.; and a plant on LeMoyne Avenue, Syracuse; and a 20 acre, antenna test site near Cazenovia, N. Y.

Dow Buys Aluminum Plant

Dow Metal Products Co., a division of Dow Chemical Co., Midland, Mich., is purchasing the Jackson, Mich., plant of Sheet Aluminum Corp., a subsidiary of Mueller Brass Co., Port Huron, Mich. The Jackson plant turns out aluminum coils, flat sheets, and such items as residential siding sheets, building sheets, lamp base stock, fin stock, and weather strip. Plant equipment includes a four high rolling mill, annealing furnaces, slitting and shearing lines, a sheet stretcher, and a roller leveler.

Hytrol Conveyor Expands

Hytrol Conveyor Co., Milwaukee, has erected a 4000 sq ft plant addition, bringing total area to more than 20,000 sq ft. The firm makes powered belt and gravity type conveyors and complete systems for manufacturing and industrial plants.

Heil Widens Product Line

Heil Co., Milwaukee, acquired the material handling equipment business of the Ingersoll Kalamazoo (Mich.) Div. of Borg-Warner Corp. The operation will be handled as part of Heil's Body & Hoist Div. at the Milwaukee plant.

Coating Line Installed

A major expansion of facilities to produce painted coils is underway at Kaiser Aluminum & Chemical Corp.'s Ravenswood, W. Va., Works. Equipment has been installed to coat aluminum in widths up to 48 in. The paint line will be capable of handling coils in gages of 0.006 to 0.064 in. The installation will augment 66 and 18 in. roll coating lines.

Dake Buys Press Line

Dake Corp. purchased the Automold press line from Automold Co., a subsidiary of Wagner Bros. Inc., West Los Angeles, Calif. The entire operation has been moved from California to Dake's home office and manufacturing plant in Grand Haven, Mich.

Exports Mill Equipment

Loma Machine Mfg. Co. Inc., New York, is designing and building an integrated casting and sawing installation for the production of copper billets, to be supplied to Manufacturas de Cobre S. A., Santiago, Chile. Madeco also has obtained an integrated Lomatic tube straightening, cutoff, and recoiling line designed to handle light wall, copper tubing from 1/4 in. to 7/8 in. OD at speeds of 200 fpm.

Eaton Mfg. Makes Changes

Fuller Mfg. Co., Kalamazoo, Mich., a subsidiary of Eaton Mfg. Co., Cleveland, is now the Fuller Transmission Div. of the parent company. Fuller's Unit Drop Forge Div., West Allis, Wis., is designated a division of Eaton Mfg. Paul E. Minsel has been appointed general manager at Fuller; Frank M. Weinhold Jr. will continue general manager of the Unit Drop Forge Div.

Astro-Fab Widens Services

Astro-Fab Inc., Wooster, Ohio, has launched an expansion program that will carry it into several new areas of activity. The company is a fabricator of titanium and offers a variety of fasteners, clips, and hooks from all the special metals. Expanded operations will include specialty forming and joining and machining facilities for tantalum, molybdenum, and tungsten.

Arcrods Enlarges Plant

Arcrods Co., Sparrows Point, Md., is expanding its Cleveland facilities for the production of welding electrodes and wires for industrial applications. A 50,400 sq ft addition to its plant at 4437 E. 49th St., Cuyahoga Heights, Ohio, will be used for wire drawing operations. Estimated cost: $800,000.

Plans Metallurgical Plant

Eutectic Welding Alloys Corp., Flushing, N. Y., will start construction this year on a $2.5 million metallurgical plant and research center, which will enable the company to produce rods and electrodes from virgin metal to finished product entirely in its own facilities.

The center will include a foundry capable of melting and pouring various ferrous and nonferrous alloys and will be used both for production of highly specialized alloys and for

"the development of new alloy systems, metallurgical processing procedures, and materials standards and specifications," says R. D. Wasserman, president and director of research.

Bronze Foundry Expanded

Darling Valve & Mfg. Co., Williamsport, Pa., has placed in operation its newly equipped bronze foundry with a melting capacity of 12,000 lb per day. The facility almost doubles the capacity of the old foundry and can handle castings weighing up to 1000 lb.

Linde Plans Fontana Plant

Linde Co., a division of Union Carbide Corp., New York, will build a liquid hydrogen plant at Fontana, Calif. It will have a daily capacity of 26 tons, of which 21 tons a day will be supplied to the National Aeronautics & Space Administration under a $31 million contract. Construction of the plant is scheduled to begin in mid-1961. Expected completion date: By June 1, 1962. Source of hydrogen will be coke oven gas from Kaiser Steel Corp.'s Fontana plant. Linde's contract also calls for monthly shipment of 150,000 to 500,000 lb of government owned liquid hydrogen from West Palm Beach, Fla., to the West Coast commencing June 1, 1961, until completion of the Fontana plant.

Builds Calamari Furnaces

DaPrato Mfg. Co., Addison, Ill., has been licensed by Calamari & Co., Milan, Italy, to manufacture and sell its low frequency induction furnace. The furnace will enable a job shop operator to melt any metal from brass to stainless steel, says DaPrato.

Rheem Buys Building Line

Rheem Mfg. Co., New York, acquired the business and properties of Calcor Corp.'s Steel Building Div., Huntington Park, Calif. Operations will continue in the leased 100,000 sq ft Huntington Park plant as part of Rheem's Automotive Div., Fullerton, Calif., of which O. W. Carrico is vice president and general manager.

CONSOLIDATIONS

Precision Metalsmiths Inc., Cleveland, acquired **Intricast Inc.**, Loudonville, Ohio, producer of investment castings, and will operate the property as its Intricast Div.

Buhler Mill Engineering Co., Minneapolis, and **Buhler Bros. Inc.**, Englewood, N. J., have merged to form Buhler Corp. The consolidated firm will maintain headquarters at 4207 Nicollet Ave., Minneapolis, Minn., until May 1, then will move into its new building at 8925 Wayzata Blvd., that city.

Modern Engraving & Machine Co., Hillside, N. J., acquired **La Bahn Machine & Mfg. Co.**, Metuchen, N. J. The consolidated firm will be known as La Bahn Corp. John La Bahn has been appointed president and general manager.

Crescent Niagara Corp. (a new corporation formed from Schoellkopf, Hutton & Pomeroy Inc.), Buffalo, purchased **Crescent Tool Co.**, Jamestown, N. Y. Crescent Niagara will continue operation of Buffalo Sintering Corp.

ASSOCIATIONS

W. G. Kirkland and R. E. Paret have been elected assistant vice presidents of **American Iron & Steel Institute**, New York. Mr. Kirkland's duties will be in the field of building research and technology; Mr. Paret's, in the promotion of the uses of steel.

New officers of **Material Handling Institute Inc.**, Pittsburgh, are: President, R. F. Moody, Hyster Co., Portland, Oreg.; first vice president, B. E. Phillips, Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.; second vice president, N. A. Price, Colson Corp., Chicago. L. W. Shea, Hanson & Shea Inc., Pittsburgh, was re-elected managing director of the institute.

National Federation of Independent Scrap Yard Dealers Inc., New York, elected these officers: President, Nathan Wills, Eastern Iron & Metal Co., Detroit; chairman, Lester Shapiro, Henry Shapiro & Co., Wilkes-Barre, Pa.; first vice president, Morton Lissner, Lissner Iron & Metal Co., Chicago; second vice president, Stanley Diefenthal, Southern Scrap Material Co. Ltd., New Orleans; secretary, Walter Emert, W. R. Emert Co., Hatfield, Pa.; and treasurer, Sidney Rockmuller, Independent Scrap Iron & Metal Corp., Brooklyn, N. Y.

NEW PLANTS

Aluminum Co. of America, Pittsburgh, has begun operating its 260,000 sq ft, aluminum diecasting plant (Edison Works) near Metuchen, N. J. Initial operations are limited to production on several diecasting machines, but the plant will also be a producer of permanent mold castings when additional facilities are installed next spring. The new plant will gradually supplant Alcoa's smaller Garwood, N. J., diecasting works and its permanent mold foundry at Bridgeport, Conn.

Simonds Abrasive Co., Philadelphia, opened a branch warehouse, sales office, and service shop at 1950 E. 20th St., Los Angeles. The firm's West Coast plant is at El Monte, Calif. The branch will also serve as headquarters for Heller Tool Co. and Simonds Saw & Steel Co., divisions of Simonds Co.

Paul Mueller Co. is constructing a dairy tank fabrication building and a warehouse addition at its plant in Springfield, Mo. The company opened a structural steel fabrication building in September. The new construction will bring total area of the plant to 125,200 sq ft.

Reynolds Aluminum Supply Co., Atlanta, opened a 40,000 sq ft plant in Jacksonville, Fla., and new facilities in Atlanta which will provide some 50,000 additional square feet of floor space.

Baird-Atomic Inc., Cambridge, Mass., acquired a 40,000 sq ft manufacturing plant in Waltham, Mass., to house its defense contract activities.

One of two Morgan 25/25 ton, 85' 0" span soaking pit cranes.

At J&L's Cleveland Works...

PRODUCTION GETS A LIFT FROM MORGAN CRANES

Morgan 75/15 ton, 85' 8" span heavy duty mill crane changing rolls on J & L's new 80" reversing roughing mill.

At the Cleveland Works, as well as at other J & L mills, Morgan cranes are earning their keep in vital production operations.

Here you see a mill-type crane, and a soaking pit crane, widely apart in capacity and function. They illustrate Morgan's awareness of a metals producer's exacting needs; and they both possess the rock-bottom operating and maintenance cost factors for which Morgan cranes are famous.

When you decide to expand or modernize, get the crane facts from Morgan—then put an experienced Morgan Representative on your planning team.

THE
MORGAN
ENGINEERING CO. *Alliance, Ohio*

E.O.C.I. MEMBER

Overhead electric traveling cranes, gantry cranes,
open hearth special cranes, blooming mills, structural mills,
shears, saws, auxiliary equipment and welded fabrications

CUTS SHELL COSTS— The Army has found a way to trim $19 a ton from the material cost of 8 in. artillery shells. A new process developed by U. S. Hoffman Machinery Corp., New York, utilizes a billet mill instead of a bar mill, cutting scrap and material requirements.

SHELL CAST TOOLS— Diecasting dies and similar tool parts are being cast in tool steel alloys with a shell mold process that is said to reproduce the parts within 0.003 to 0.005 in. of each other. In larger parts, such variations are only 0.015 in., says Wisconsin Pattern Works, Racine, Wis.

PLASTIC PARTS— An automotive engine designer believes a compression molded, thermosetting plastic could be used as a cover plate for aluminum engines. Advantages: No machining and improved resistance to corrosion, oil, and water.

NUMERICAL CONTROL SUBSTITUTE— A tracer system with small positioning stops is said to be a practical, inexpensive way to adapt lathes to a type of numerical control. The setup is simple, claims Bald Mountain Machine Co., Pontiac, Mich. The unit is also said to hold 0.0002 in. tolerances on common machining stock. Conversion costs run $8000 to $12,000.

VARIABLE CROWN— Now you can get abrasive belts that achieve any degree of crown you want. (They run on an inflatable rubber drum.) The setup eliminates edge cutting from flat bands, improves accurate grinding of narrow areas, and diminishes chattering, claims Behr-Manning Co., a division of Norton Co., Troy, N. Y.

METEOROLOGICAL METALLURGISTS— Discovering why silver iodide crystals precipitate rain when they are seeded in a cloud may lead to better understanding of solidification physics in castings. Scientists at the Illinois Institute of Technology, Chicago, say silver iodide serves as a good nucleus for ice (it must form first to cause rain) because its surface energy is higher than that of ice, not because the crystal structure is the same. In metals, for example, tin is a good nucleus for lead, but lead is not a good nucleus for tin.

CORROSION PROGRESS— Several firms, including Inland Steel Co., Chicago, are developing corrosion resistant coatings containing a high percentage of nickel. They are sprayed, dipped, or painted on metal surfaces. A reducing atmosphere (at 1700 to 2100° F) converts the coatings into a no crack, no peel layer of nickel. Additions of chromium boride, or tungsten carbide, improve wear properties. Applications: Outdoor furniture, water tanks, car bumpers. The material can double as a brazing compound for low stress applications.

SOUND CASTINGS— Sonics and ultrasonics have enabled diecasting firms to produce designs formerly considered too complex for such methods. Sound can improve mechanical properties and surface finish, claim experts, but "must be used as a new technique, not to correct existing faults in die designs."

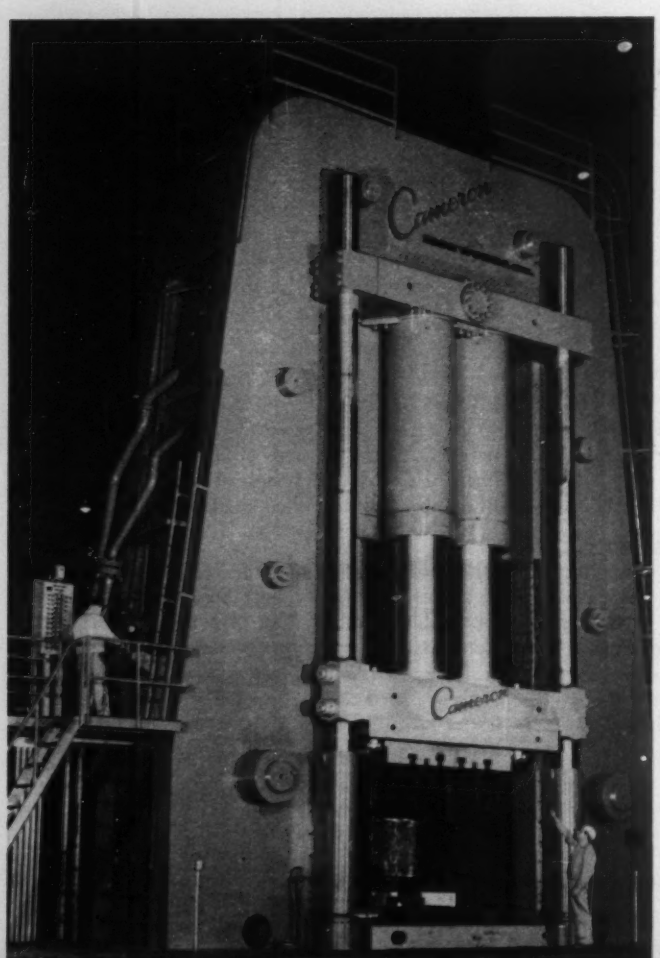
NEW REFRACTORY ENTRY— Titanium diboride, perhaps the strongest material at 3600° F, is being produced for lightweight bearings for jets, cutting tools, crucibles, and aluminum production cells, says Union Carbide Corp., New York. Previously the material was produced in only small quantities.

BUILDS UNDERCUT GAGE— You can measure weld undercut defects with a gage described as practical, positive, and unvarying by the U. S. Navy. The device is one of many outlined in a Bureau of Ships publication (PB 161715).

'SKIMMING' U 235— The centrifugal principle of a cream separator may be applied to isolating fissionable uranium 235, says the Atomic Energy Commission. The development is probably several years away, but present theory indicates such a plant is practical on a small scale and could cut power costs.

"Our new press should help us meet the ever increasing demands for large forgings, with close tolerances, intricate shapes, and superproperties. We'll do jobs we couldn't touch before," says Herbert Allen, Cameron Iron Works Inc.

Press to Forge the 'Impossible'

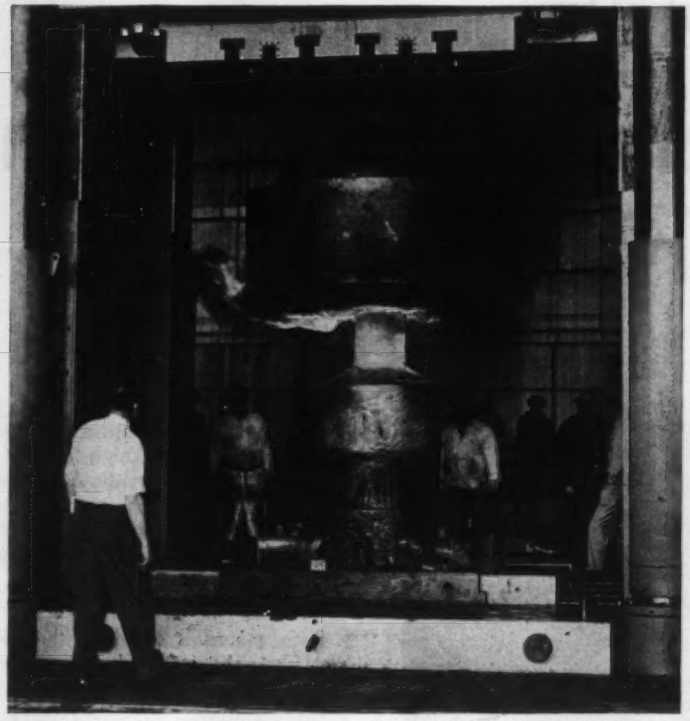


INDUSTRY'S continual demands for larger forgings of higher and higher properties sometimes outstrip a forger's capabilities to make them. That happened to Cameron Iron Works Inc., Houston. Result: It conceived and built a 20,000 ton, multiple ram press to produce parts the engineers felt couldn't be made before.

Cameron says the press will permit it to turn out forgings and extrusions larger and more intricate than heretofore possible. Extrusions, for example, can be 30 ft long, up to 56 in. in diameter, weighing up to 30,000 lb. Using the company's split die technique, the engineers feel the new press (big brother to a seven year old, 11,000 ton model) will make intricate shapes and sizes in larger forgings than have been produced.

In addition to ferrous metals, the press will be put to work on materials such as molybdenum, tungsten, tantalum, molybdenum-tungsten, tantalum-tungsten, columbium, and more exotic alloys.

• An "impossible" order forced the new press into reality.



The dies open after extruding an A-286 hollow forging. The forged part weighs 6000 lb. At right, a just completed missile case adapter is lifted from the press

"We had been thinking about a press that would do some of the things this one will do for a long time," says Herbert Allen, vice president and general manager. "We knew about what we wanted—even had a wooden model of it—but it was not until one day last June that we really got busy.

"That day Jerry Brougher, head of our Special Products Div., came to me with word that a critical job was up that we couldn't do."

The challenge of that job led to a crash program that turned out the press in less than six months. At a meeting on June 24, Cameron executives gave the green light to the program. On Dec. 15, the press was tested in the shop.

The first forging from the press was an aircraft shaft weighing 6000 lb, made out of A-286 chrome-nickel steel. The shaft is 12½ ft long, shaped like a funnel, with the large end about 3 ft in diameter and the shaft end 12 in. in diameter. An 8 in. hole runs axially through the shaft.

• The press can exert a combination of forces.

Eight cylinders can push down with 20,000 tons on the main rams. A piercing ram (inside the main ram) can come down with 4200 tons.

Each of the two side rams (not yet installed) can squeeze with 5000 tons—7500 tons each under intensification.

The four pushback rams gross 940 tons. The net stripping force is 400 tons, and the bottom knockout punch delivers 650 tons.

The press has a whopping 15 ft of daylight, and a 90 in. stroke. The frame is 50 ft top to bottom—31 ft side to side. The bottom platen is 12 ft square. A specially designed throttling or flow control permits the operator to run the press anywhere in the 0 to 400 ft a minute range.

Brown & Root Inc. erected the special building that houses the press. Bethlehem Steel Co. furnished the huge forgings for the press frames, and Wyatt Industries Inc. handled the construction.

Preliminary blocking and forming will be done on a 4000 ton press adjacent to the new press. Then final shaping and piercing will be done on a 6000 ton press.

• Extrusion and split die techniques extend the range of the press.

The operator can drop the main piercing ram assembly out of the press. That leaves a 56 in. hole in the main bolsters and in the moving and top platens. Extrusions can then go up through this hole.

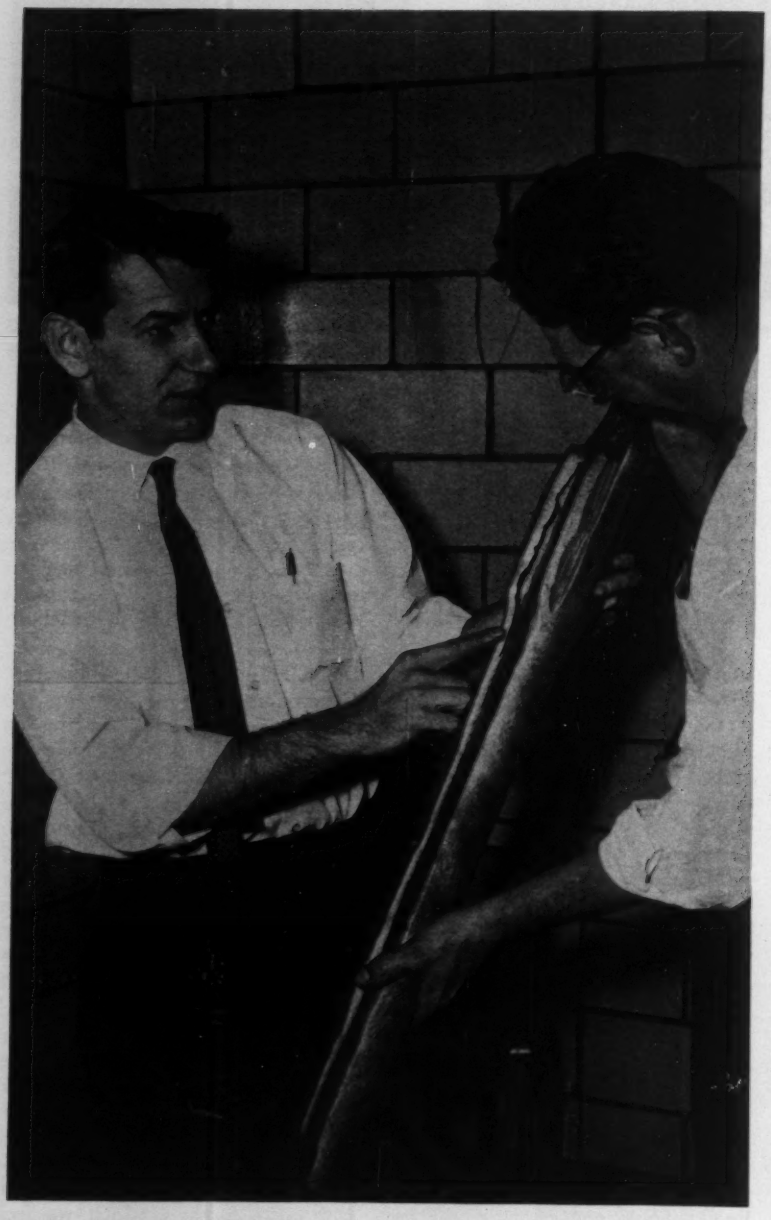
Split die forging makes use of the top rams and both side rams. Usually, the side rams squeeze the die halves on the part and the top ram then comes down to force the metal to fill all die cavities.

In split die forging, there is little or no flash, so waste is minimized. Grain flow can be closely calculated and controlled to give maximum forging properties, permitting part weight to be held down. Split dies require no draft and that can trim the machining time needed to finish the parts.

Mr. Allen summarizes: "Two or three years ago, it became apparent that we had to begin to think about a more advanced and larger piece of forging equipment. Now, we have added a press to the inventory of this nation's assets that will make forgings which we feel cannot be made on any other press."

Metallurgist Lynn E. Sprague explains how . . .

Vacuum Melted Materials Trim Space Age Forging Problems



Metallurgist Sprague (left) illustrates surface tear caused by impurities

THOSE who seek improved forgings of high strength, high temperature alloys, and superalloys should consider the benefits of vacuum melted materials, says Lynn E. Sprague, assistant chief metallurgist, Steel Improvement & Forge Co., Cleveland. He reports:

- Such materials permit standardized forging temperatures and heat treating cycles.
- Surface tearing is drastically reduced.
- Center soundness of billets eases standard forging operations, such as drawing out, fullering, edging, and flattening.
- Yield is increased. (Scrap is reduced.)
- Minimum test values are improved.
- High values of mechanical properties tend to become equal in all directions.

• Case histories and the experiences of Steel Improvement illustrate the value of such material to forger and user alike.

Steel Improvement makes many turbine wheels for aviation gas turbines and large industrial turbine generators. Forging and heat treatment involve a close prediction of response based on a typical composition. Close composition control, inherent cleanliness, and minimum of segregation in vacuum metals allow a standardization of those procedures which is not always possible with air melts.

The schedule for one firm's product (made with an air melted alloy) involved a heat treatment at 1800 to 1950° F, followed with an aging treatment at 1300 to 1400° F for 10 to 25 hours. A second aging (20

Mr. Sprague lists advantages based on his experience in handling high temperature alloys. Fewer rejects, improved performance more than offset increased material costs

to 40 hours at 1200° F) completed the process.

"We usually didn't know whether the heat treatment was satisfactory until after the stress rupture test. Experience showed that 40 to 50 per cent of the wheels had to be treated again and retested," states Mr. Sprague.

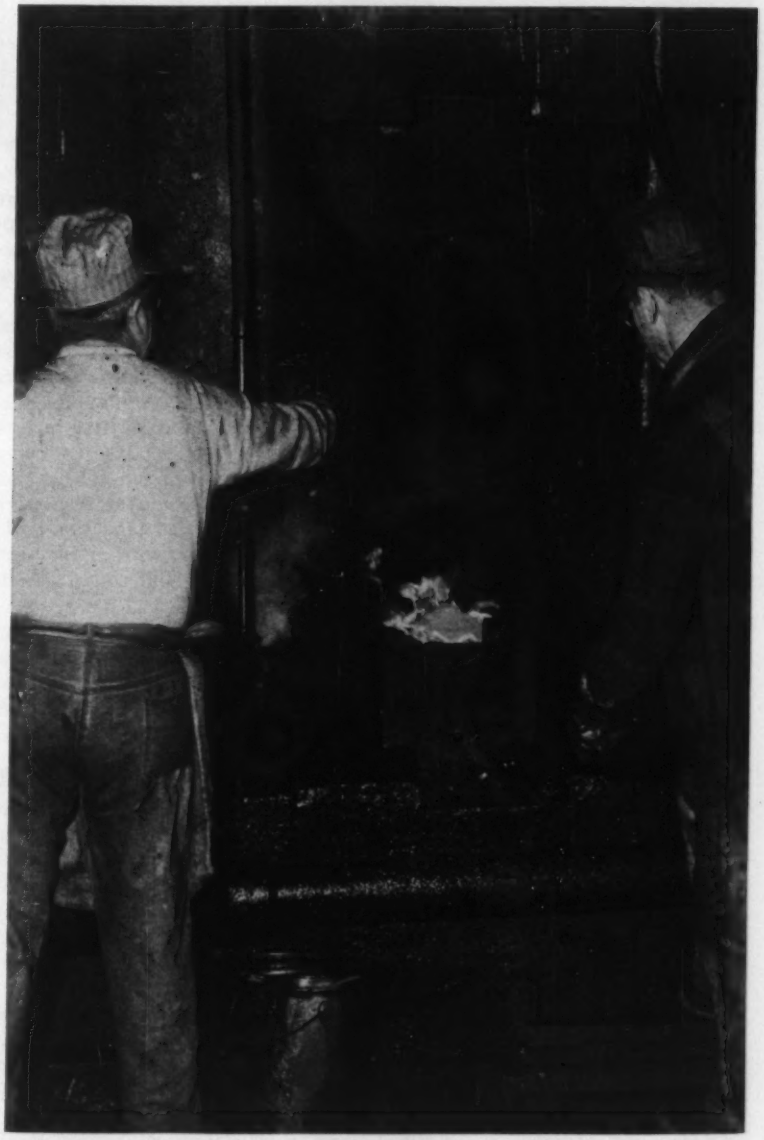
A switch to vacuum melted metal has shown a good response to an established heat treatment cycle. The parts are solution treated at 1950° F, then double aged at 1400° F and 1200° F for 20 hours at each temperature. Reheat treatment has been cut to less than 10 per cent.

• Vacuum materials reduce surface tearing, improve center soundness and yield.

Surface tearing is often caused by stringer type segregation within the raw material. Steel Improvement has been able to cut rejections measurably with vacuum melted materials.

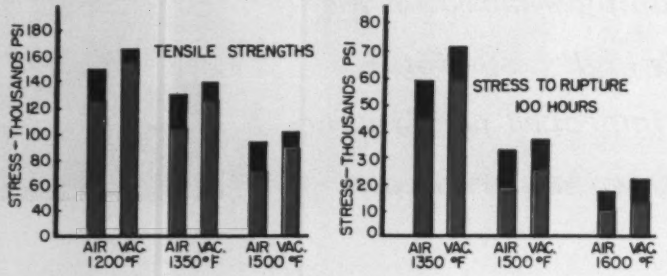
For example, a typical gas turbine bucket material, M-252, was originally furnished air melted. Scrap rates with the best forging techniques often ran 40 per cent due to forging tears—most of which occurred during stock preparation. Vacuum melting reduced the percentage of scrap to less than 8 per cent.

Another example: A typical turbine wheel is made of A-286. Rough turned stock was used to eliminate any possibility of carbonitride stringers near the surface. Consumable electrode refined metal permitted the use of conditioned square stock, in itself a saving. Conditioning was greatly cut and gross weight reduced. Fewer rejections appeared via ultrasonic indications and me-



Operator applies lubricant to top die of steam drop forge during forming of an aircraft turbine wheel at Steel Improvement & Forge Co., Cleveland. Firm claims vacuum melted materials are easier to handle

How Vacuum and Air Melting Compare



Vacuum melting significantly improves tensile and stress rupture strengths of high temperature alloys, claims Mr. Sprague. How much is illustrated by these graphs for a typical high temperature alloy, M-252. Maximum-minimum values are improved, and scatter (spread, shown by solid bars at top of each column) is also decreased

chanical property variations.

Similar comparisons have been made with turbine wheel and other rotating parts made of SAE 9310.

• Minimum test values are a part of missile and aircraft specifications.

The difference in minimum mechanical properties is clearly shown by the comparative graphs above. Those are normal values representative of forging stock and forgings, says Mr. Sprague.

The gas turbine material, A-286, is becoming important in airframe construction. Many minimize or overlook the importance of the alloy's notch sensitivity. But that factor is important because of the dimensional configuration of an airframe in service, he says. Vacuum melting improves notch sensitivity, another advantage to the user.

Another significant material, H-11, also illustrates the advantages. Anticipated ductility in an air melt (reduction of area in a transverse direction) would be 4 per cent at 280,000 to 300,000 psi. Test values of the vacuum melted counterpart are better than the 6 per cent minimum and 10 per cent average, the normal specification requirement.

• High temperature alloys depend on the effects of extremely reactive elements like aluminum, boron, titanium, and zirconium. Vacuum melting seems to permit more efficient use of them.

Major problems confronting forge shops in handling high temperature alloys: Segregation, inclusions, property variations of physical properties, and erratic response to forging temperatures.

"About the time people learned that vacuum melting was a necessity in titanium production, it was also noted that consumable electrode or induction melting was a definite advantage in producing many nickel, iron, or cobalt base alloys. One outcome of that work was the knowledge that you could produce forgings with mechanical properties fairly uniform in all directions.

"A titanium alloy airframe forging (4Al-4Mn) provided proof of that. After sectioning, we learned that transverse and longitudinal properties are essentially constant," says Mr. Sprague.

Another example: 300-M alloy. It is sometimes applied to structures which require tensile strengths above 270,000 psi. Applications had been restricted by the erratic ductility in the transverse direction present in air melted material—they were in the neighborhood of 5 to 8 per cent, says Mr. Sprague.

Perhaps 70 per cent of material heats were lost because of inability to meet specifications. Vacuum melted 300-M has a transverse reduction in area in excess of the 10 per cent minimum and averages out about 15 per cent, including the center material, reports Steel Improvement.

Short Arc Welding Slashes Reject Rate

Other benefits reported: Less metal distortion, faster welding speeds

CHANGING from standard to Short Arc welding enabled Conco Engineering Works Inc., Mendota, Ill., to cut rejects to 1 per cent. Reject rates had been so high that company engineers seriously considered an expensive retooling program.

In addition, welding rates are now three times faster.

The firm manufactures contoured cones for the front end of 2000 lb practice bombs made of SAE 1020 steel. Sheets are cut to size, rolled into a cone, and welded in a jig.

After welding, the cone is stretched to shape in a form die with a contoured punch.

Previously, cones often tore along the heat affected zone during the 18 per cent elongation. Short Arc welded seams do not rupture.

The Short Arc, (a method developed by Linde Co., a division of Union Carbide Corp., New York) features low voltage and a fast freezing puddle. Instead of a spray of droplets, weld metal is deposited in the puddle by alternate shorting and reigniting. Short circuits occur dozens of times each second, producing low heat input. Advantages claimed: No burnthrough and a minimum metal distortion.

SHORT ARC WELD

. . . completes long seam on bomb nose cone

Composite Material Does Double Duty

Copper coated steel provides combination of physical and electrical properties

STRENGTH and resiliency have been combined with electrical conductivity in a copper plated steel to solve product design problems.

James R. Kearney Corp., St. Louis, is using the material, called Copperply (it's made by National-Standard Co., Niles, Mich.)

• The material is coiled and formed into contact arms for open-type fuse cutouts used on rural power lines.

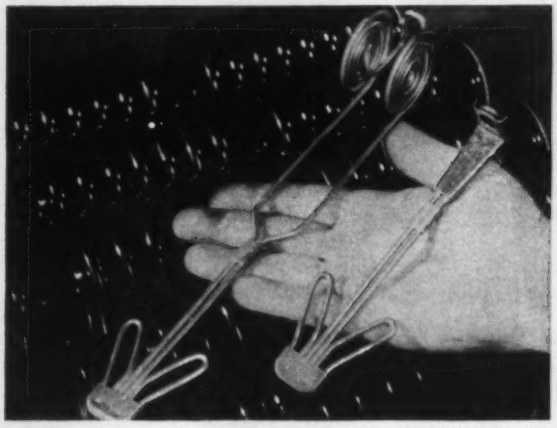
National-Standard says the copper plate is uniform within 1 per cent of over-all diameter. Close tolerances permit accurate coiling and forming and make for uniform distribution of electric current; hot spots do not occur at contact points.

• The contact arms perform several functions in the cutouts.

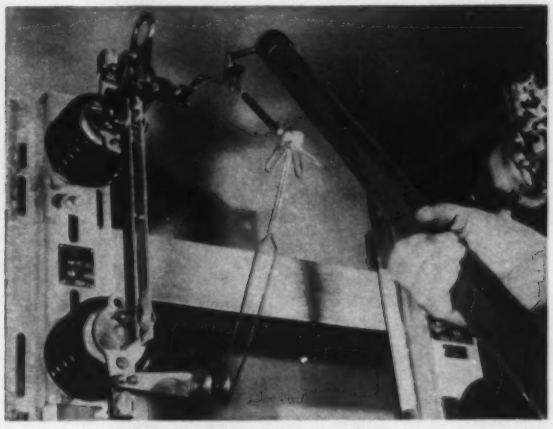
The lower arm is formed into a double coiled spring. It loads the fusible link mechanically with enough tension to assure separation of the fuse ends when the fuse melts. The flexibility of the arms absorbs the mechanical forces that occur when a fuse blows, isolating the ceramic insulator.

Upper and lower contact arms are formed into a wing shape at their outer ends. Fuse links are easily slipped into these wings with a hook stick. All arms have solid copper end caps, center punched in place. Collars are crimped and soldered on the arms for rigidity.

Arms and coil springs are formed for fused cutouts



Contact arms are bolted to mount



Hook stick places fuse link between contact arms

Team Focuses on Machining Problems

Challenge of Space Age machining creates a need for broad dissemination of knowhow, experts say. Company establishes organization to do the job

TWO THINGS most machining experts agree on: First, basic knowhow is still needed to solve some of our tough machining jobs. Second, most plants could machine more effectively by taking advantage of what's already known.

Researchers at Metcut Research Associates Inc., Cincinnati, are setting up a Machining Data Center to go to work at helping industry on both counts. The center has cut out two job areas for itself. It will gather, correlate, and disseminate information on metals, alloys, and nonmetallic materials. It will also provide machining data and recommendations or other suitable assistance.

• New center will come up with solutions to machining problems.

Despite all the machining tests that have been run in the past (Metcut has done a host of them and is responsible for much of the work in the four volume, Air Force Machinability Reports, for example), the group of Cincinnati engineers feel: "Increased testing activity relative to all types of machining operations is badly needed. These data will serve as a background for preliminary machining recommendations and experimentation in specific problem areas."

They say experimental determinations of optimum machining conditions for all operations, alloys, and heat treated conditions represent a volume of work that probably never will be completed, but the gaps can best be filled in by a team of experts that have done much of the ancillary work. They intend to become such a team.

Further, Metcut managers are convinced that the most effective and economical way to meet present and future needs for machining information is through a systematic program in which data gathering is done at a single location on a continuing basis.

• The center also will function as a collector of available information.

The second part of the Metcut program is to get all available pertinent data together, sort it out, interpret it, and become a single source for most of today's machining and machinability knowhow. This information, Metcut says, is now widely scattered and is not used effectively.

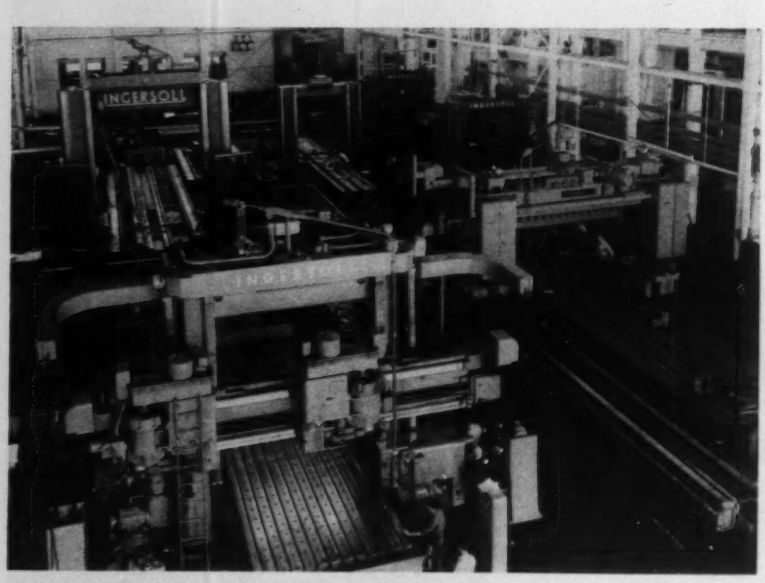
Perhaps even more important, there's sometimes substantial disagreement among different sources of machining data for similar materials and operations. Specialists, they hope, can resolve most of these disparities.

• Maintenance of the center will be paid for by sponsors.

Metcut intends to solicit metalworking companies to sponsor the work at a fixed annual fee. All information gathered will be made available to the sponsors.

In addition, nonsponsoring companies will be able to buy reports, and either sponsors or nonsponsors may have the center work on problem programs. They will be done at the standard labor hour rates of the Data Center, says Metcut.

Norman Zlatin is director of the new center. John Maranchik Jr. is assistant director. Both are Metcut vice presidents and have done extensive work in machinability research.



SIX GIANT MILLING MACHINES enter final assembly and run-in stages at Ingersoll Milling Machine Co., Rockford, Ill. The machines are worth a total of about $2.5 million. The machine in the foreground went to a large machine shop; the one behind it is for a foreign rolling mill maker. The gantry type machine (far right) is for large turbine-generator work, and the three machines at right rear will work on automotive body dies

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SCHLOEMANN
ROLLING MILLS · HAMMERS · PRESSES

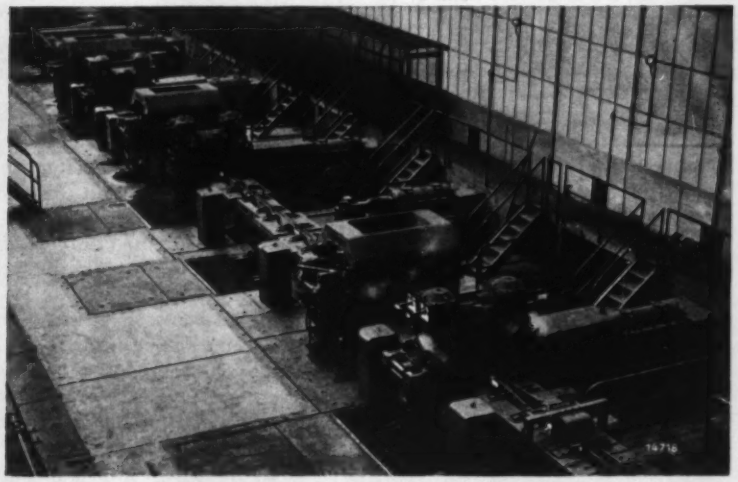
Advanced Design Bar and Rod Mill Proved Success

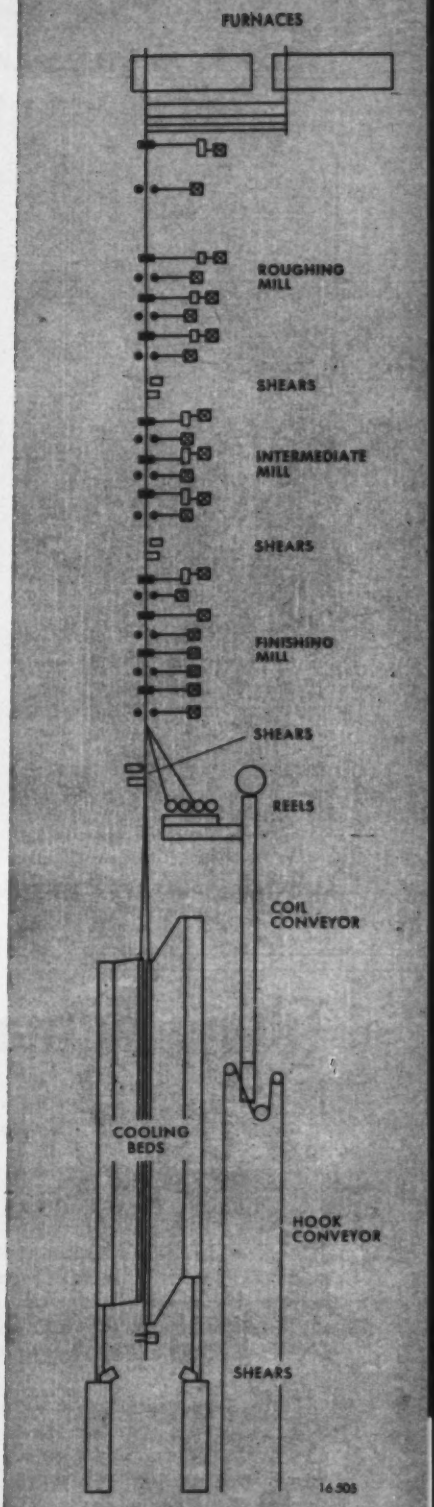
In 1951, Fiat of Italy placed a contract with SCHLOEMANN for the construction of a bar and rod mill. Designed primarily for rolling high grade and alloy steels to very close tolerances, mass-produced qualities were also to be handled. SCHLOEMANN solved this problem in a manner that was revolutionary at the time: The complete continuous mill is laid out with individually driven horizontal and vertical stands. This eliminates a 90° twist in between each stand, and besides improving the quality, closer limits may be held on the finished material. They are ± .004 in. for single-strand and ± .008 in. for double-strand rolling of .025 in. rounds.

Interchangeable stands complete with accessories are provided for the intermediate and finishing trains. The horizontal or vertical traverse of the stands to the roll face, as the case may be, is powered hydraulically. Stands not needed when rolling large sections may be hydraulically removed from the rolling path. Automatic speed control of the mill motors in the intermediate and finishing trains is obtained through loop lifters. In 1957 the mill's capacity was extended through the addition of a second cooling bed. This plant provides proof that SCHLOEMANN combines progressive engineering with utmost operational economy.

Technical data

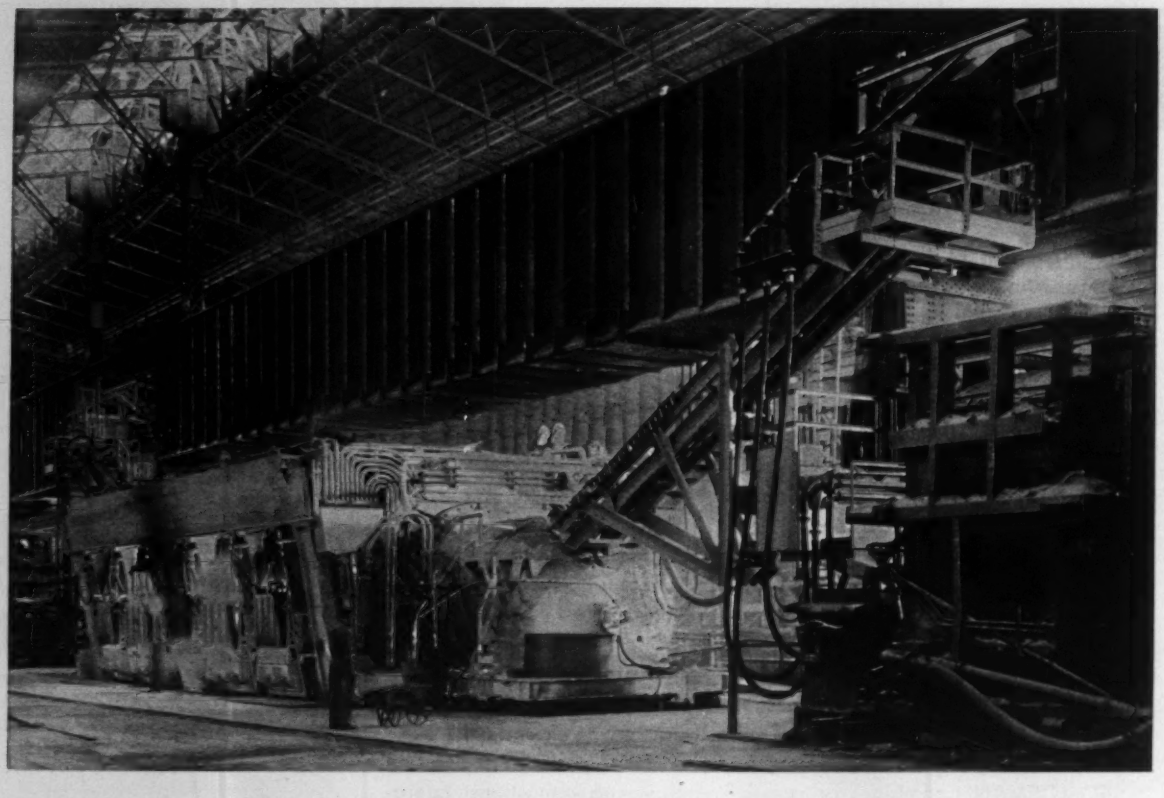
Starting material	
Cross section	2¾, 3½ and 4¾ in. sq.
Length	13 ft.
Weight	240, 550 and 980 lbs.
Finished products	13/64 to 2 in. rounds and corresponding sections
Type of rolling	single and double-strand
Output	60 tons an hour





SCHLOEMANN-built bar and rod mill in H/V layout at the Fiat works.

FELLER ENGINEERING COMPANY Empire Building, Pittsburgh 22, Pa.



Open hearth productivity is increased when . . .

Tilting Furnace Is Altered To Use Oxygen Efficiently

MANY STEELMEN expect radical redesign of open hearths for optimum operation with oxygen to keep the furnaces competitive with relatively newer, pneumatic steelmaking processes.

Tilting type open hearths changed over to oxygen practice so completely that they cannot revert to former production levels have increased steel output and decreased ingot cost at Appleby-Frodingham Steel Co., Scunthorpe, England, a branch of United Steel Companies Ltd. They also permit greater flexibility in steelmaking.

Operation of the first two converted furnaces was described at the Iron & Steel Convention, Cleveland, by A. Jackson, the company's technical director.

• Early experience with oxygen convinced the company that its furnaces should be revamped.

As early as 1950, the company was using consumable, steel pipe oxygen lances in its 300 ton, tilting furnaces. The practice was found to increase production, but it accelerated refractory wear and increased ingot cost. Lancing during melting was discontinued, but oxygen was still used for combustion.

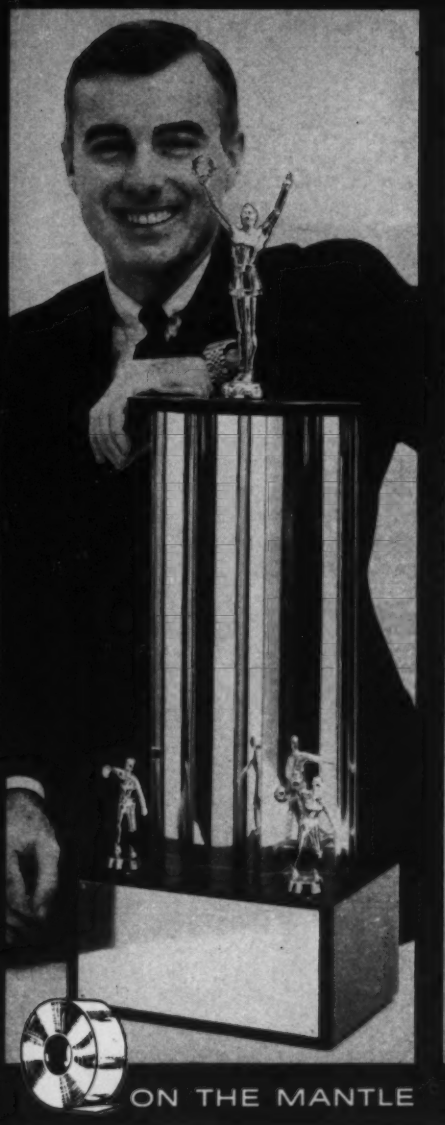
In 1957, one of the furnaces was stripped down to the hearth and rebuilt as an oxygen blown unit. A high percentage of phosphorus in the molten iron caused foaming in the slag, so the charge had to be reduced to 60 per cent of standard furnace capacity. Iron oxide fumes blocked the regenerators, and air infiltration increased the volume of exhaust applied to the gas cleaning system.

In the most recently modified furnaces, gas outlets were made smaller to compensate for slag foaming. That permitted the charge to be increased to 70 per cent of standard capacity.

Oxygen is admitted through lances and burners and with air intake through the regenerators. Water cooled, mechanically operated lances at each end of the furnace are long enough to permit deep immersion.

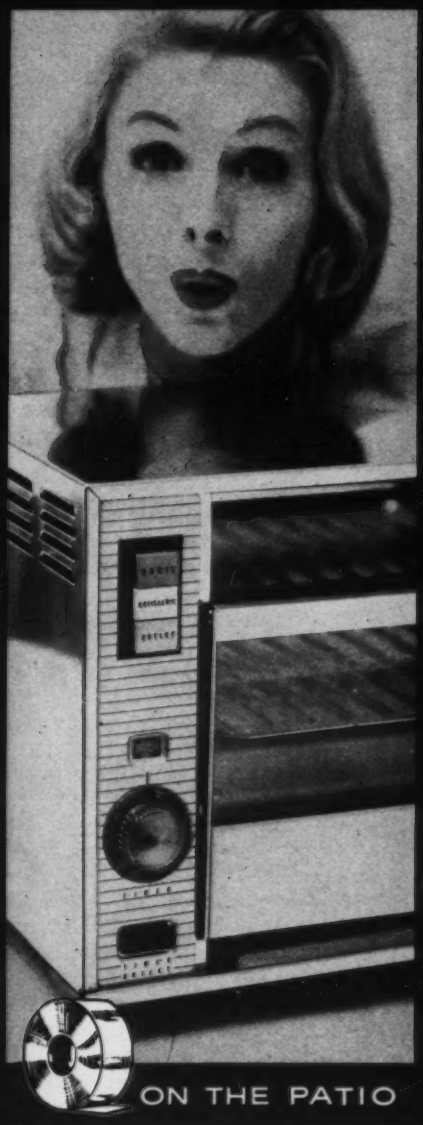
Burners designed for coke oven gas are built into the four corners of the tilting hearth — ports are merely inlets and outlets for hot air and waste gases. Outlets are encased in steel shells that can be

NICKELOID IS EVERYWHERE



ON THE MANTLE

ON CARPETING



ON THE PATIO

These eye-catching products use functionally a basic Nickeloid Metal. The finish of Chromium, Nickel, Brass or Copper is electroplated to a base metal, usually Steel (but often Zinc, Brass or Copper).

Mostly, Nickeloid Metals are supplied in continuous coils in widths up to 24" for modern, low cost fabrication. They're also available in sheets and strips. Optional: bright or satin finishes, plating one or both sides, a galaxy of stunning patterns and crimps.

Quality plating produces metals so durable they can be fabricated, even quite severely drawn or bent. Rejects minimized. For severe stamping, we offer Mar-Not protective coating that is easily peeled off after its job is done.

Which is your preference in modern metals — the clean, flint-hard gleam of Chromium, the warmth of Copper, or the rich radiance of polished Brass? No need to answer now, but consider the galaxy of wonderful products you find everywhere today that employ one of the Nickeloid Metals. These durable, lustrous finishes are not mere lily-gilding. In most instances they are designed INTO the product . . . functionally. We make a raw material that has been given these quality finishes the *automated* way . . . in giant coils in block-long mills. Nickeloid finishes are electroplated to the base metal *before fabrication*, a process as fundamental we believe as the coating of printing papers in rolls *before they are printed*. Three out of five costly manufacturing steps are by-passed. Write for our free Introductory Kit, which includes metal samples — learn the complete story.

AMERICAN NICKELOID COMPANY • PERU 1, ILLINOIS

America's Pioneer Manufacturer of Pre-Finished Metals — Since 1898

removed or installed with the charging crane.

Cylindrical slag pockets and regenerator chambers are enclosed in steel casings and made airtight. They are small—regenerator diameter is reduced to 10 ft, providing about one-sixth the cross section available in a standard furnace. Gas velocities in the regenerator are more like those in a blast furnace stove than those in a conventional open hearth. Pairs of slag pockets and regenerators at each end of the furnace permit one set to be cleaned and replaced while the other set is in use.

End openings on the tilting hearth are small, circular, water cooled shells. Offtakes on the mobile carriage press against the hearth to prevent air infiltration.

Chrome-magnesite bricks are used for the roof and other furnace lining. The hearth is magnesite brick, with a dead burned dolomite working lining.

• Burners are turned off, and the furnace is operated as an oxygen blown vessel during most of the heat.

Between tapping and charging, the furnace is fired with coke oven gas; combustion is accelerated with oxygen through jets below the gas inlet.

Before charging, the furnace contains 20 to 30 tons of molten steel and all refining slag from the previous heat (7 to 14 tons). About 12 tons of ore and 5 tons of limestone are charged, and the furnace is fettled with dolomite. Molten metal is brought from an active mixer to the furnace in a series of 70 ton ladles.

Combustion gas and oxygen are turned off while the second ladle of hot metal is charged, and lances deliver oxygen to the bath at rates up to 75,000 cu ft per hour.

Hot air through the regenerator is adjusted to 5½ times the volume of lanced oxygen; almost all carbon monoxide from the metal is consumed in the hearth.

About 30 minutes after charging, complete analysis of charged hot metal is received, and additions are made. Oxygen required to bring the bath to 1.0 per cent carbon and 0.1 per cent phosphorus is calculated. When that amount of oxygen has been delivered, slag and metal samples are taken, and temperature is read with an immersion pyrometer.

Oxygen lances are withdrawn, and gas is turned on to reduce foaming, so the slag can be inspected. If slag composition is satisfactory, the furnace is tilted, and the slag is poured off. If slag composition isn't satisfactory, further lancing, melting down with fuel, or addition of hot metal or oxides and lime may be required.

The time oxygen lancing is interrupted for slag removal can vary —from no time for dead soft steels to 45 minutes for high carbon or special grades. Reason: Reversion of phosphorus may occur in the final refining phases.

• Soft steels usually require a minimum of oxygen in the final blow. More careful adjustment is needed for higher carbon steels.

The volume of oxygen required to adjust the bath to 0.3 per cent above final carbon analysis is calculated; that amount of oxygen is introduced by further lancing or additions of ore, depending on bath temperature. (More lancing is required if bath temperature is low.)

Fuel is shut off for the final oxygen blow. When the calculated oxygen has been added, the heat is sampled. Steel is usually to specification, except for carbon content, which is then checked at 7 minute intervals.

For soft steels, lancing may be continued until the furnace is almost ready to tap; for higher carbon grades, fuel firing may be continued an hour or more after lancing is stopped. Tapping procedure: The furnace is tilted and the heat is poured off into two, 110 ton ladles.

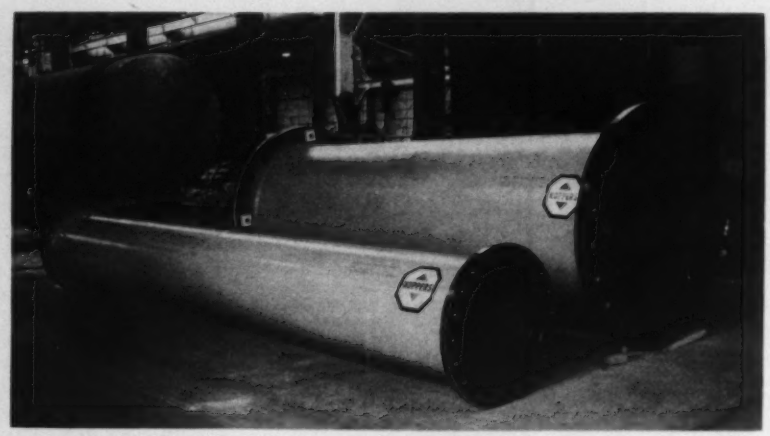
• Converted furnaces are said to combine high output with low capital and operating costs.

Revamping of the furnaces increased their production rate 51 per cent above that of a modern, all basic open hearth, and 102 per cent above that of an old, silica furnace, in which the structure below stage wouldn't handle increased fuel firing necessary in all basic practice.

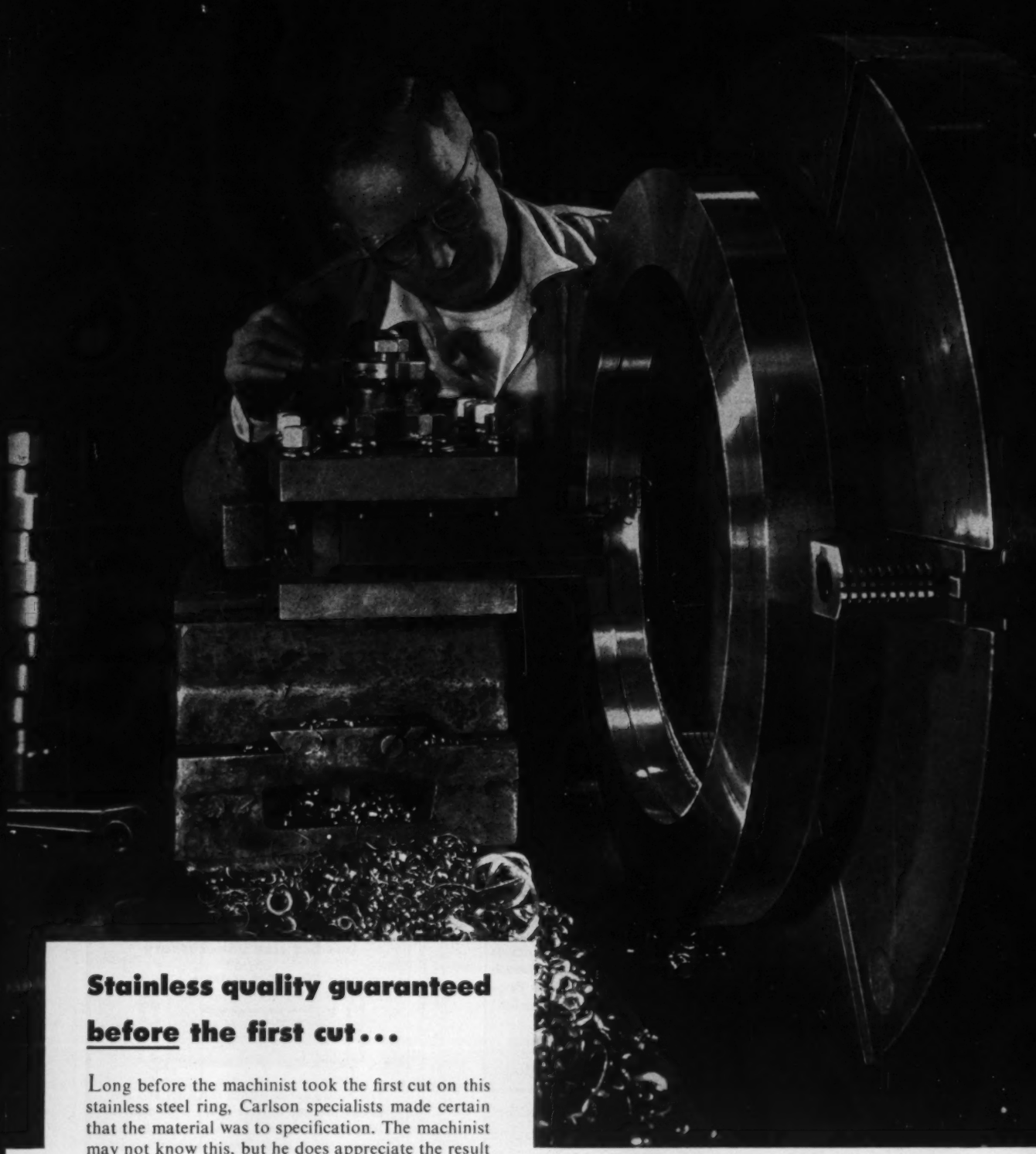
Conversion cost for the two units has been recovered through increased capacity and lower production costs. Estimated operating costs: About 68 per cent of those for standard open hearth practice. Iron recovered from slag pockets, flue dust, and gas cleaning equipment—about 13½ lb of iron per ton of steel—helps reduce the cost per ingot ton.

Capital cost of the furnaces (new) is said to be 60 to 65 per cent of that for equivalent production capacity from conventional equipment.

Quick change components make for high furnace availability; only the furnace body has to be repaired rapidly. Other parts are removable; repair of spare sections can take as long as four weeks—the normal time between rebuilds.



12 OUTSIZE COUPLING SPACERS LIKE THESE (largest Koppers Co. Inc. has built) connect giant electric motors to roughing and finishing stands in the new, 80 in., hot strip mill at Great Lakes Steel Corp., Detroit. Couplers (they weigh up to 17,000 lb) are welded. They were fabricated by Struthers Wells Corp., Warren, Pa.



Stainless quality guaranteed **before** the first cut...

Long before the machinist took the first cut on this stainless steel ring, Carlson specialists made certain that the material was to specification. The machinist may not know this, but he does appreciate the result —the ease of machining to meet the most exacting requirements.

Whether you want rectangular stainless plates, pattern-cut special shapes, or machined products, you will save fabricating time by making full use of Carlson services. Fabricators of chemical, process, nuclear, aircraft and missile equipment recognize the advantages of these services.

Our specialists will be glad to work with you in producing just what you want, delivered on time. Telephone, write or wire for action.

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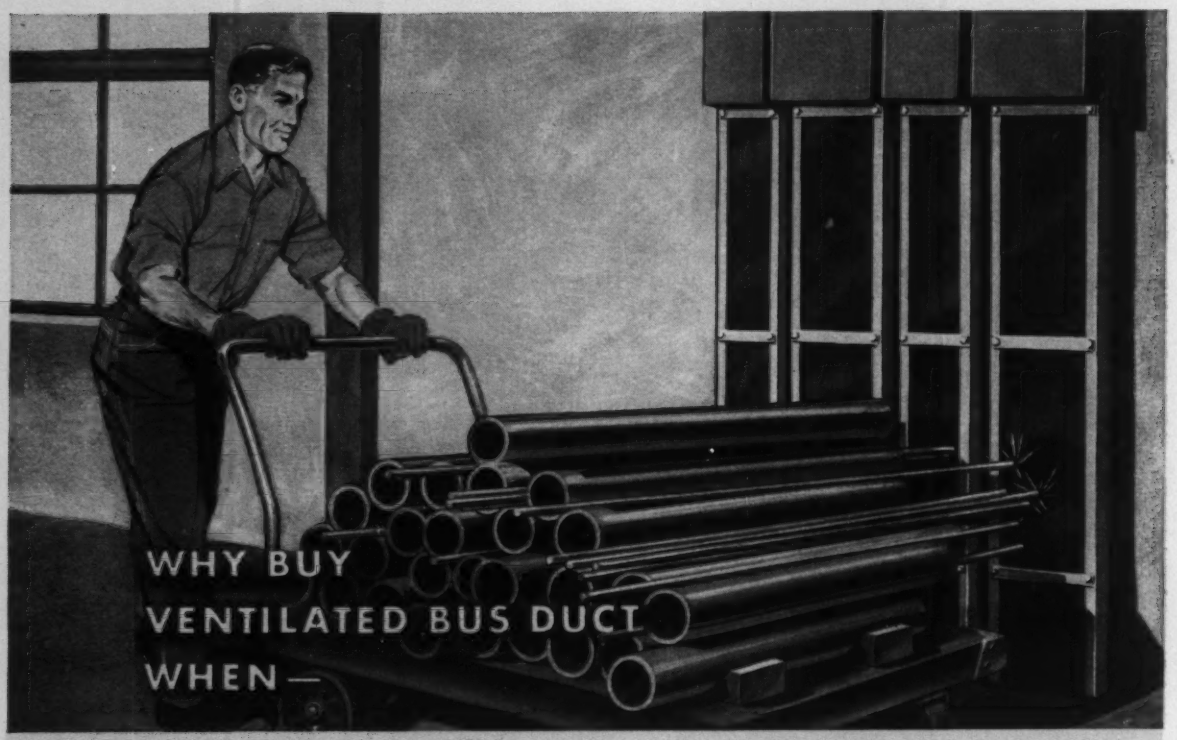


Square D TOTALLY ENCLOSED Duct* is SAFER—*and costs no more*

*(low impedance)

• Ventilated bus duct may be as vulnerable as it looks. In fact, Paragraph 3644 of the National Electrical Code prohibits its use in certain areas by specifying:

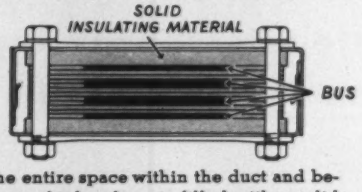
> **"Busways may extend vertically through dry floors if totally enclosed (unventilated) where passing through and for a minimum distance of six feet above the floor to provide adequate protection from mechanical injury."**

All Square D low-impedance duct is totally enclosed! It has no ventilation holes open to falling objects or dust. It's smaller than ordinary ventilated bus duct. It mounts in any position without de-rating. Doesn't it make sense, when buying low-impedance duct, to specify a product that's safer? Square D totally enclosed low-impedance duct costs no more—why settle for less!

Here's Why Square D's

EXCLUSIVE Design

makes ventilation and increased bus bar size unnecessary



The entire space within the duct and between the bus bars is filled with a solid insulating material which conducts the heat to the surface. There are no dead air spaces inside the duct. Square D totally enclosed low-impedance duct meets U/L requirements for temperature rise with no larger bus bars (hence, no higher cost) than ventilated duct.

SQUARE D COMPANY

wherever electricity is distributed and controlled

Stainless Steel Strengthens The U. S. Capitol Dome

ABOUT 10,000 lb of stainless steel were used (for strength and long life) in renovating the dome on the nation's Capitol.

In 100 years of service, it had been damaged by corrosion and expansion and contraction of its structural members. (Tests made in 1865 indicated the dome oscillates 3 to 4 in. on a summer day.)

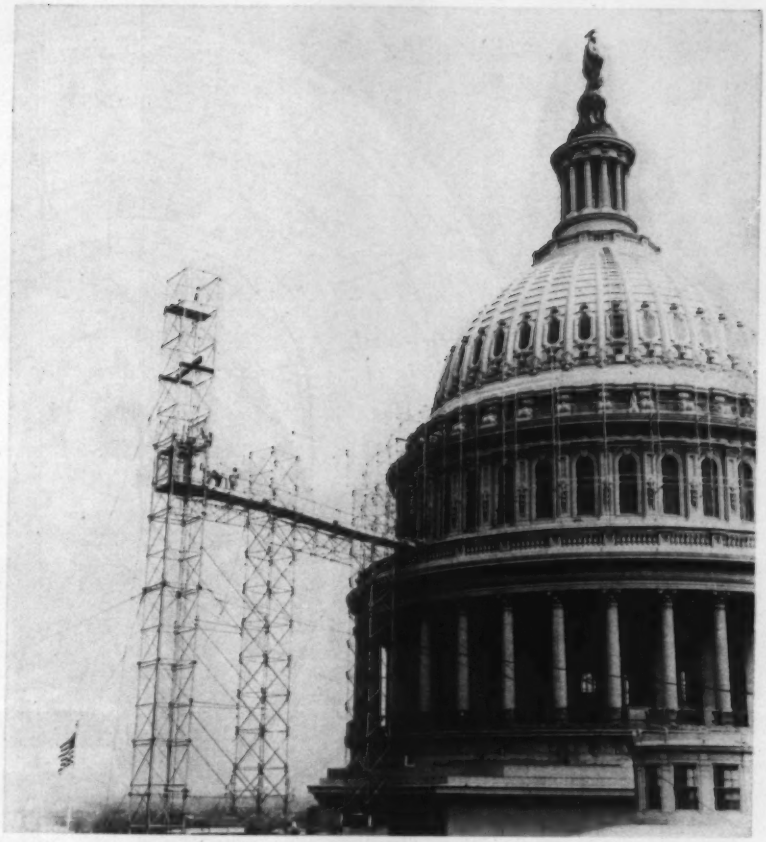
Resting on a masonry bearing wall, the dome gets its primary support from 36, vertical, cast iron ribs. The interior ceiling is supported from the ribs, which also support the Statue of Freedom atop the structure. The chief structural material is cast iron (about 4500 tons of it).

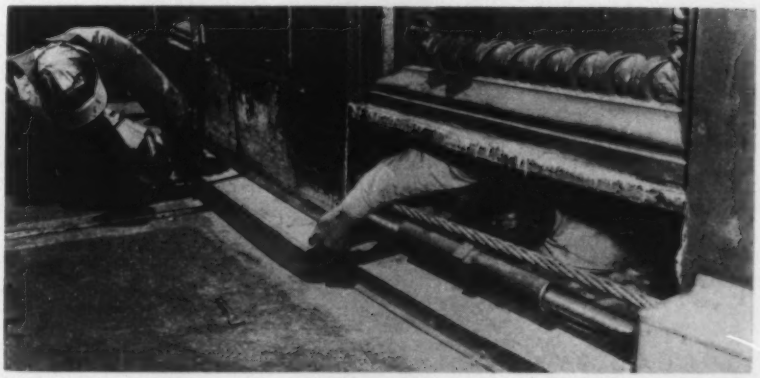
• **Problems**—A ring made up of steel tie plates encircles the ribs at their bases, acting much like a barrel hoop. This area presented the immediate problem, reports the engineering firm that made a detailed inspection of the dome in 1955 at the request of J. George Stewart, architect of the Capitol. Abrasion caused by expansion and contraction and corrosion had reduced the thickness of the ring as much as 75 per cent.

Additional support was given to the dome ribs by two stranded stainless steel cables. Fastened to the ribs with sheave boxes, the cables take over part of the load from the tie ring. Many of the bolts in the structure were replaced with stainless types.

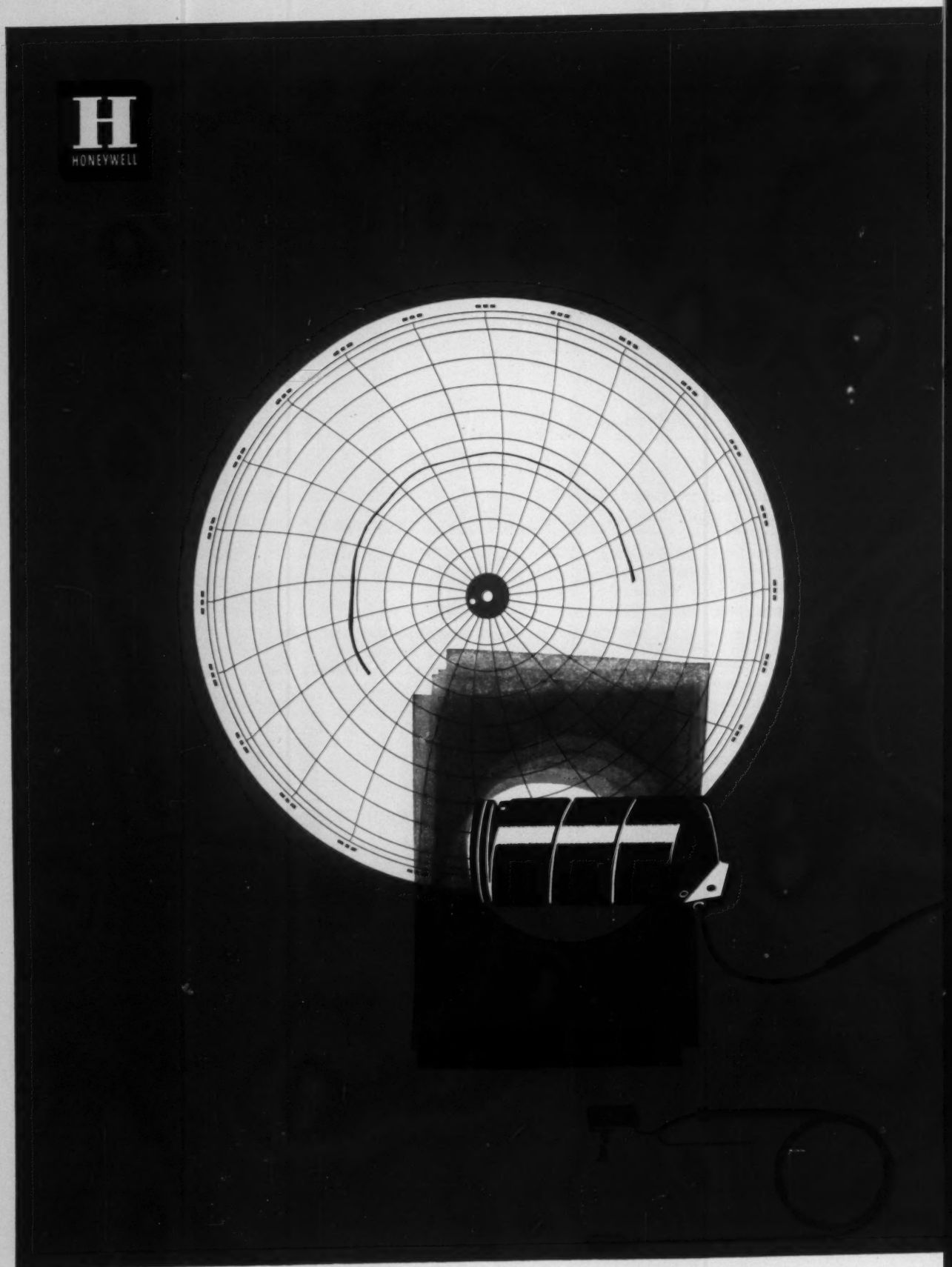
Other uses of stainless included expansion joints for the cast iron balustrade, anchors for the ornamental assemblies, plates to repair deterioration, flashing at the base of the ribs, and stainless mesh to repel birds in certain areas.

In the final stages, some 30 coats of paint were removed; the metal was primed; and two new coats of paint were applied.





Two stainless steel cables, installed at the base of the dome, give additional support to the 100 year old structure. Many stainless bolts were also used


H
HONEYWELL

The New Honeywell Thermal System

withstands extreme vibration and corrosion conditions

Here's a new gas-actuated thermal system that takes the zig-and-zag out of temperature recording under severe vibration conditions.

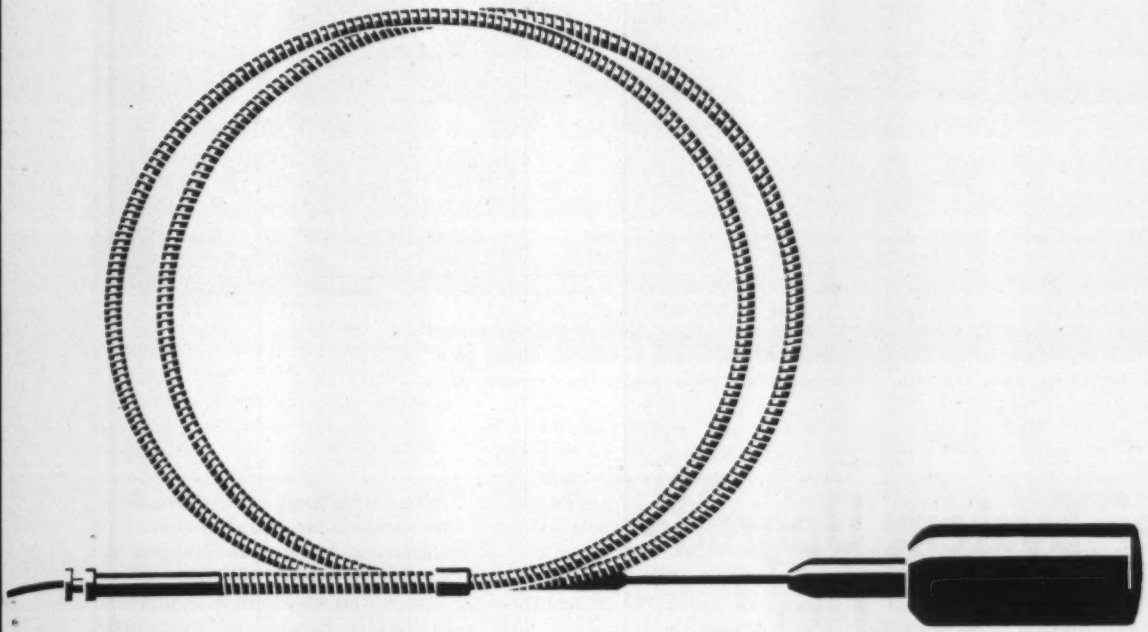
A complete series of vibration tests has proved the vibration resistance of the new Class III thermal system. In these tests, the Class III system was installed in a standard Honeywell rectangular case recorder, and subjected to forced vibrations in three mutually perpendicular planes. With accelerations up to 0.2G from 0 to 200 cps, maximum pen oscillation was limited to 1.5%. For more than 75% of the range, *pen oscillation was less than 0.5%!* . . . with no resonant effects at 60 cycles.

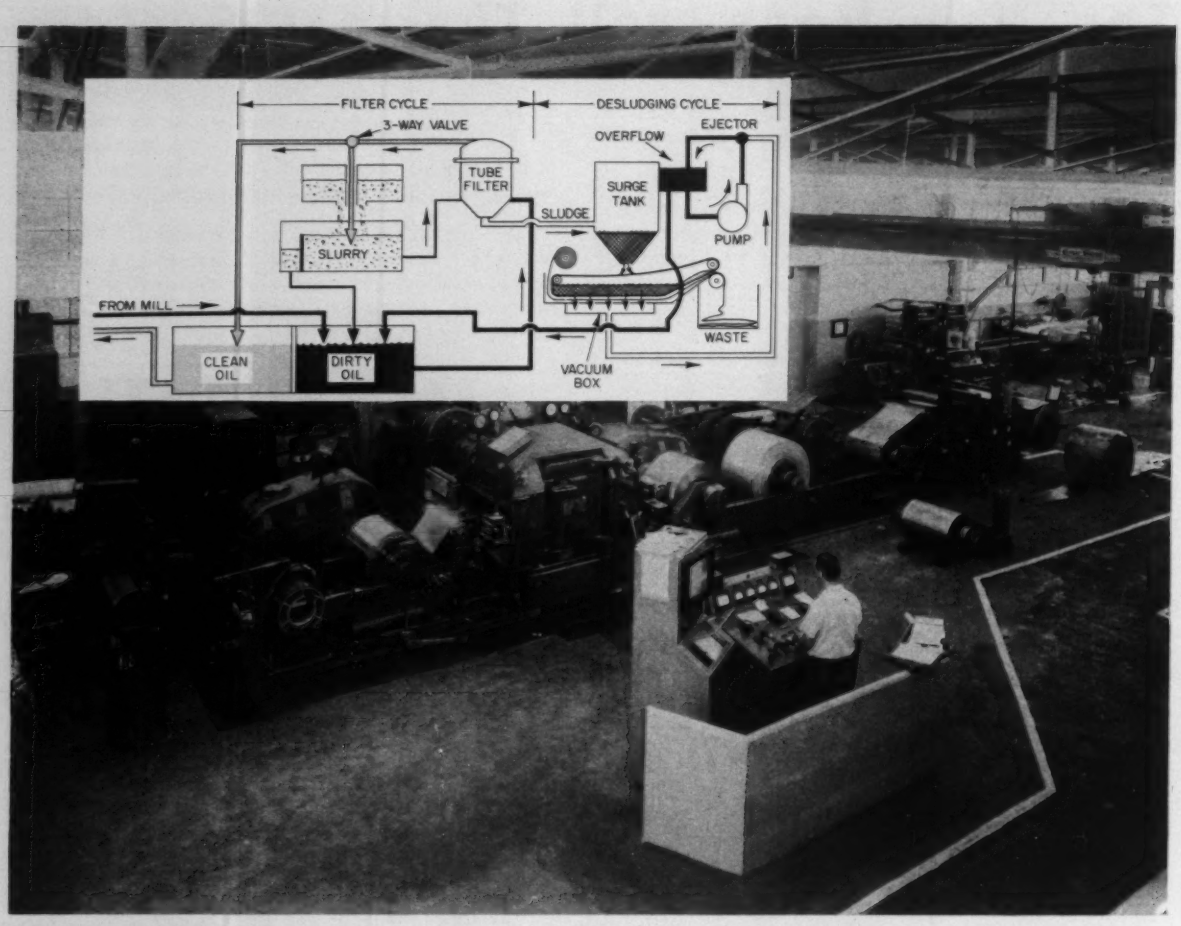
Check these many new design and construction features: high-energy helix for increased sensitivity and lower dead spot; built-in overrange or underrange protection; stainless steel bulbs to withstand corrosive atmospheres; low carbon 316 stainless steel linkages with low-friction, ball-joint construction; coarse and fine zero adjustments for easy settings.

Get the complete story on the new Class III Thermal System by contacting your nearby Honeywell field engineer today. He's as near as your phone. MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pennsylvania.

Honeywell

H HONEYWELL *First in Control* SINCE 1885





Foil thin strip from these Sendzimir mills must be free of oil stains and other surface flaws. Filter precoated with a slurry combining chemical and mechanical cleaning (inset) removes contaminants from mill oil. Vacuum action takes sludge from spent slurry

Filter System Upgrades Ultrathin Steel Strip

Mechanical action takes out solid particles that would cause dents and scratches; chemical processing removes soluble material that would stain the steel

CLOSE TOLERANCES and flawless finish are getting top priority in the production of metal strip and foil for precision parts in the aircraft, missile, electronic, and automotive industries.

Stainless steel foil, resistance welded to form honeycomb sections like those needed in the proposed B-70 bomber, must be as thin as 0.00075 in. and free from surface defects.

Such products are produced in Sendzimir, cluster roll mills by Rodney Metals Inc., one of the leaders in custom and conversion rolling of ultrathin strip. The company puts heavy emphasis on clean lubricants for its two mills; it recently installed a filtering system that is said to combine mechanical action for removal of solids with chemical action for disposal of soluble decomposition products. The system, called Hydro-Vac, was supplied by Hydromation Filter Co., Livonia, Mich.

• Stainless steel strip and metal foil must be kept extremely flat and stainfree.

One of the mills rolls metal strip 25 in. wide to a thickness of 0.001 in. The other turns out 12½ in. wide material as thin as 0.0005 in., with a ±3 per cent tolerance. Beta ray gages constantly monitor and record the thickness of metal strip as it comes from the mills.

"Removal of solids from the oil is absolutely necessary to prevent dents and scratches which would cause downgrading or rejection of the material," says Charles W. Smith, vice president, Rodney Metals. "And soluble contaminants—such as acids and asphaltines—must be eliminated to prevent staining."

• Cleaner oil makes for higher quality strip and insures longer mill service life.

The filtration system is said to make quality control easier and more effective by removing soluble and insoluble wastes from the lubricant before it is fed into the nest of work and backup rolls in the mill.

Machine maintenance costs are said to be lower with clean oil. Rolls run longer before they need grinding, and cleaner lubricants reduce wear on internal mill parts. Automatic purging minimizes maintenance on the filter system.

• Two kinds of earth filter media are fed into the system from hoppers; roll filter material is used in the desludging cycle.

Perforated, vertical tubes in the main filter tank are coated with a slurry, which is composed of oil, diatomaceous earth for mechanical filtering, and fuller's earth for chemical purification. Oil passing through the tubes and the filter media loses its impurities in the coat of filter material.

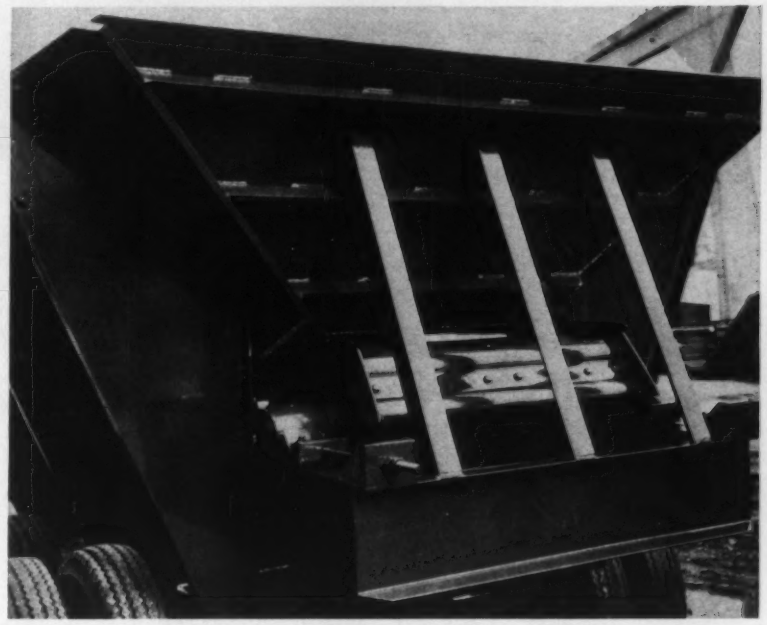
When the filter is saturated with contaminants, pressure buildup in the system actuates a dump valve, causing the coating to be blown from the tubes by compressed air. The pipes are then given a new coating of filter material from two supply hoppers. Time required for the automatic purging and recharging cycle: About 5 minutes.

After recharging, the system resumes operation, turning out clean oil at 125 gallons per minute.

Slurry containing contaminants, when it is blown from the filter tank, passes into a surge tank and a desludging system, where oil is drawn through a roll type filter medium under vacuum, then returned to the dirty oil tank. Dirt and precoat powder are collected on the filter medium, which is delivered periodically to a waste bin.

Award winner finds that . . .

Stouter Metal, Weld Design Upgrade Trailer Ore Feeder



WELDING design for a trailer style pan feeder brought a net cost reduction of 8 per cent to Pioneer Engineering Works Inc., a subsidiary of Poor & Co., Minneapolis.

It also won an award in the annual machine design competition sponsored by the James F. Lincoln Arc Welding Foundation, Cleveland.

Although the hopper-feeder is heavier than its predecessor, and employs more material to improve wear resistance, the firm was able to cut its labor costs enough (via welding) to offset the increase in material costs.

• The pan feeder handles ore, rock, or gravel from dump trucks.

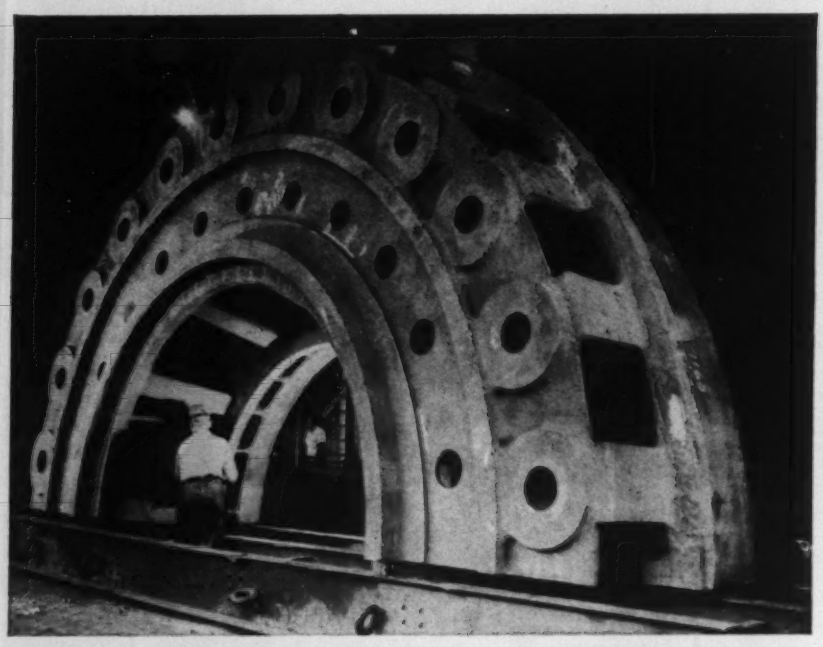
The feeder device is mounted on a trailer for flexibility. Dump trucks unload at one end. A conveyor along the bottom of the feeder moves rock toward the delivery end, dumping it into a crusher.

The previous feeder was fabricated from an assembly of steel plates. Principal elements of the hopper were $\frac{3}{8}$ in. black plates surfaced with a $\frac{1}{4}$ in. wear plate that could be easily replaced.

Engineers decided to substitute a 1 in. plate for the hopper in the welded design to increase rigidity and eliminate double plate construction.

The hopper now has three basic pieces which require only a small amount of oxyacetylene burning to fit the ends. Outside reinforcing members for the hopper sides are made of triangular sections of $\frac{1}{2}$ in. plates spaced along the sides. Even greater strength is built in by bending the edges of the reinforcing plates and adding a horizontal stringer along the outside lower edge of the hopper.

Intermittent welds on the reinforcing members minimize distortion and reduce welding.



More Than Meets the Eye in "ELECTRICITY at YOUR FINGER TIPS" . . .

The author of this article is Joseph A. Shuffstall, General Manager of Administrative Services, Erie Forge & Steel Corporation, Erie, Pa.

Before throwing an electric switch, have you ever hesitated to give a fleeting thought to why electricity is your instant servant?

Here's a typical example of what is contributed by industry to make possible the enjoyment of your many electric servants. This 44 ton steel casting, made in the foundries of Erie Forge & Steel Corporation, Erie, Pa., is one of 12 half covers for 6 hydro-electric turbines, each of which will produce 150,000 kilowatts of electric power on the Lewiston Project near Niagara Falls, New York. Altogether, these six 200,000 horse power turbines will furnish 900,000 kilowatts and there are 19 more of smaller horse power on this project alone.

Now think of baking a batch of fluffy biscuits, a light, white loaf of bread, a birthday cake. The same procedures the baker follows are used by the foundrymen who cast these mammoth covers. First, skilled engineers and foundry technicians design and build the correct patterns for moulds, "the cake pans" into which the ingredients are poured, white hot molten steel. Then the ingredients, carefully measured and controlled by the metallurgists, must be exactly right to make sure the casting will do its job perfectly.

To get technical right here, the large 9 foot 6 inch bore core was made integral with the mould by aligning core box with sweep spindle and ramming it on bed of mould. This eliminated the necessity of transporting, handling and setting extremely large cores. A segmental type pattern with a ring type riser on the cope side eliminated the cope portion of the mould. Directional and progressive feeding of the molten metal during the solidification period was made possible by slight design modifications promoting a sound homogeneous structure.

After stripping, the castings were subjected to hydro-blasting and the arc-air method for excavating surface imperfections. Finally, rigid dimensional inspection was followed by magnetic particle and radiographic examination at critical areas.

Here, at Erie Forge & Steel, experienced engineers, metallurgists and craftsmen control quality every step of the way from raw materials to finished steel casting.

This short sketch covers only a small part of industry's contribution to the multitude of machines which, working as a unit, make "electricity at your finger tips" a commonplace and useful reality.

ERIE FORGE & STEEL CORPORATION

ERIE, PENNSYLVANIA

Surface Grinder Takes Work 108 in. in Diameter

THIS LARGE, vertical spindle, surface grinder has a 96 in. diameter, full magnetic chuck, and will swing and grind to the center of work 108 in. in diameter. The chuck will hold a maximum workload of 10,000 lb.

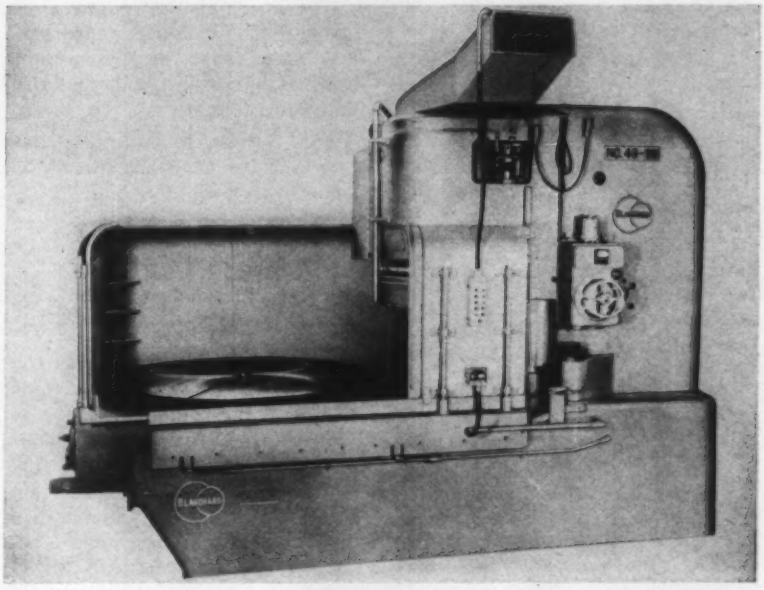
Work up to 40 in. in height can be accommodated under the 48 in. diameter, Cortland type, segment wheel.

The chuck completely clears the wheel in the loading position. Base ways and guide strips for the chuck table are hardened to help assure long, accurate life.

A 100 hp spindle motor is standard equipment.

Automatic lubrication is standard for the base and column ways, wheel dresser, and feed screw.

For further information, *write* Blanchard Machine Co., 64 State St., Cambridge 39, Mass.



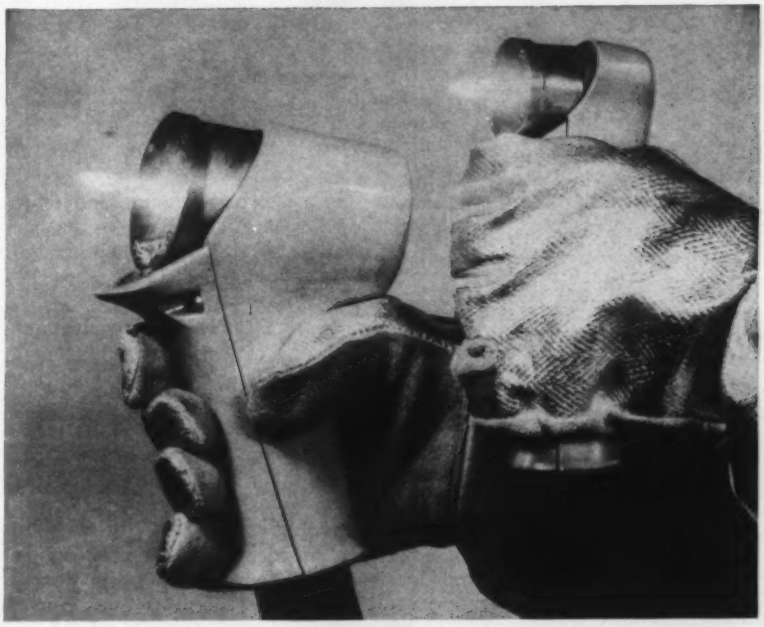
Small, Light, Plasma Guns Need Less Work Space

SUCH hard to reach places as interior walls of small rocket nozzles, cylinders, and chambers have been coated successfully with corrosion resistant and high temperature materials in testing an arc plasma spray gun that is less than 2 in. long and 1½ in. in diameter. It weighs less than 1 lb.

The company says the gun (rated at 25 kw) attains an operating efficiency of more than 60 per cent (conversion of electrical energy to heat).

The unit can be used with standard Plasmadyne consoles and carries a 200 hour electrode life guarantee when used with argon.

Another unit, an 80 kw arc plasma gun, deposits coating material over three times faster than any other portable plasma spraying device, the company says. Zirconia is deposited at the rate of 10 lb per



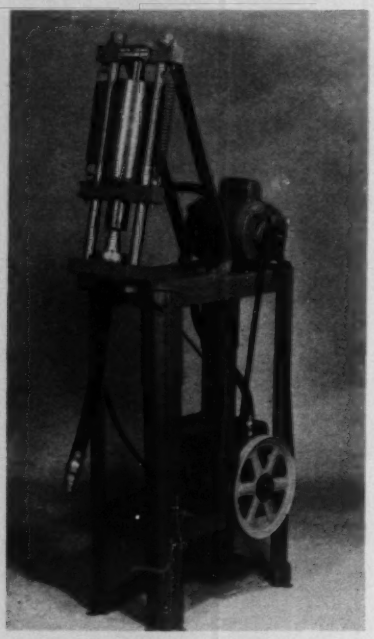
hour; alumina, 12 lb per hour; tungsten, 20 lb per hour. The 80 kw gun weighs 4½ lb, is 2¾ in. in diameter and 4 in. long.

The company also makes a 40 kw gun.

For further information, *write* Plasmadyne Corp., 3839 Main St., Santa Ana, Calif.

Unit Fits Hose Couplings

A HOSE coupling machine is designed to repair or replace hydraulic, gas, oil, and water hoses. Hydraulic power is used to swage



factory type ends on hose in 30 seconds, says the company. Electric or manual powered units are available.

For further information, *write* Manufacturers Associates Inc., Perry, Iowa.

Versatile Motors Range From 1/150 to ⅓ hp

FRACTIONAL horsepower applications can be handled by a versatile series of shaded pole (two, four, and six pole) and six pole, split capacitor motors.

The motors can be wound for 115, 208, or 230 volt operation at 50 or 60 cycles and can be designed for single or double shafts, thermal protectors, special mounting rings, terminals, or other features.

The smallest in the line is a 35 watt, shaded pole (two pole) unit rated at 3000 rpm and 1/150 hp at 115 volts, 60 cycles. Largest: A six pole, permanent split model rated at 1/3 hp and 1075 rpm.

All motors feature moistureproof slot and cell insulation, centrifugally diecast rotors, and extra large bearings with or without relubrication provisions.

For further information, *write* Leece-Neville Co., 989 Athens St., Gainesville, Ga.

Strip Break Control Stops Material Damage

AN AUTOMATIC noncontact control which anticipates material breakage and automatically stops the rolling of strip is offered by Allis-Chalmers.

The control has magnetic amplifier, static switching circuits with an indicating tensiometer. (It's basically an application of the bistable characteristics of the sensitive magnetic amplifier with logic circuitry applied to the windings.)

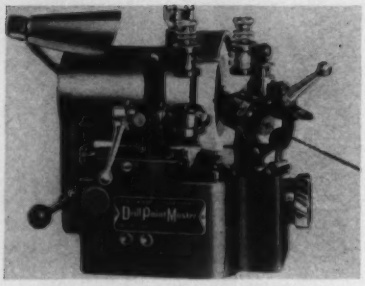
It can be used on any mill with an indicating or regulating tensiometer.

For further information, *write* Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Precision Drill Grinder Duplicates Point Geometry

THE JOB of producing and reproducing any desired point on any drill from #80 to 0.250 in. in diameter can be done by the Drill Point Master.

Features include independent adjustment of point angle, lip length, and relief angle; two variable power microscope viewers and sealed beam light for precision setting; a point angle adjustable (by degrees) from 60 to 180 degrees; lip relief from 0 to 26 degrees; and point thinning controlled to a thousandth of an inch by micrometer adjustments of wheel slide and point thinning carrier. All settings can be



logged for exact duplication at any time.

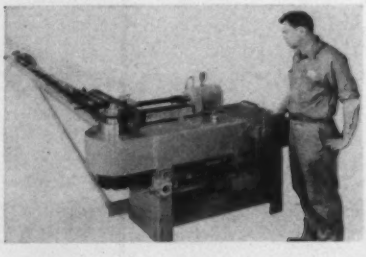
One collet chuck serves both sharpening and thinning positions without readjustment and only a minimum number of collets are required to take a full range of drill sizes. The drill is located optically under magnification up to X15 and the accuracy and shape of the new point is independent of lip wear, eccentricity, or other existing conditions. The collet chuck permits drills of any length to be ground without interference.

For further information, *write* Leland-Gifford Co., Worcester 1, Mass.

Pipe Benders Can Be Easily Transported

A SERIES of bending machines is equipped with removable mandrel support beams—useful where compact, easily transported benders are required. They are accurate, easy to operate, and can bend stainless steel pipe and other difficult materials, says the company.

The units can be operated with or without mandrels. Three levers at the operator's control station position the mandrel, advance the pressure die, and rotate the form die. A hinged clamp die secures the work to the form die with 360 degree contact, exerting clamping pressure through a cam actuated latch. After bending, the latch releases the clamp die and both the latch and



FOILS DELAY OF COILS!

Acme Idea Man Gene Fairbank (right) suggested Idea No. S4-12 to United Flat Rolled Products, Chicago.

United Flat Rolled Products, Chicago, beat bottlenecks in slit coil production with a conveyorized Acme Steel F4 Strapping Machine—and tripled production capacity in the process!

Slow hand strapping methods tied up slitting equipment as much as 45 minutes per hour. Now, slit coils flow smoothly from slitter to strapping machine on roller conveyors. One operator, handling both coil tying and unitizing operations, keeps well ahead of two slitters.

Solving sluggish production problems is an every-day challenge to your Acme Idea Man. For full details, call him or clip the coupon.

ACME STEEL

IDEA LEADER IN STRAPPING

ACME STEEL COMPANY
AcmeSteelProductsDivision
Dept. SBS-11
135th St. & Perry Ave.
Chicago 27, Ill.

Please send me Idea No. S4-12 and examples of how major companies in my field use Acme Steel Strapping.

Name _____

Title _____

Firm _____

Address _____

City _____ *Zone* _____ *State* _____

the clamp die swing open and out of the way. The bend can then be lifted directly upward out of the die. The feature is important when handling long parts or parts with multiple bends.

You can get 1, 2, and 4 in. models. The 2 in. model has a capacity of 2 ips for stainless steel pipe, or 3½ x 0.065 for stainless steel tube.

For further information, *write* Costello Engineering Corp., 1150 W. 135th St., Gardena, Calif.

Water Soluble Base Aids Plunge Grinding

SURFACE BURNING in plunge grinding is said to be eliminated with a water soluble grinding base (No. 609). It features high lubricity.

The product makes a transparent emulsion at 50:1 dilution (with water) and does not form heavy deposits on the machine.

For further information, *write* Baker/Gubbins Co., 1448 Wabash Ave., Detroit 16, Mich.

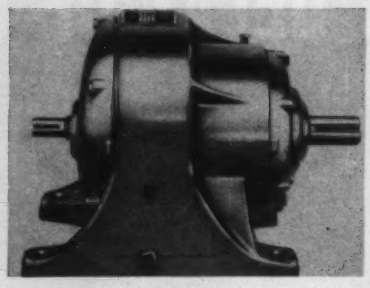
Reducers Designed for Low Speed, High Torque

DOUBLE reduction, Syncrogear speed reducers incorporate an improved gear arrangement for low speed, high torque, and extra capacity. Two types of gear train construction are provided (depending on rating).

Type GDO has a normal double reduction gear train. The other, Type GLO, has double reduction and uses a duplex gear arrangement. Type GLO is suited for crowded applications. It uses two primary gears and two final pinions to share the load from high speed pinion to slow speed output gear.

Fully hardened, helical gears give maximum speed reduction and eliminate gear breakage from heavy duty loads. Keeping parts down to a minimum cuts excess wear and maintenance problems, says the company.

The units require separate, direct



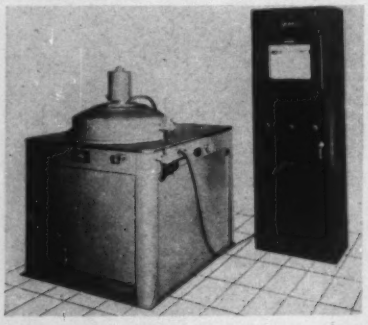
connected motors. Direct connection can also be made by a V-belt or chain drive. Protection against motor reversal (during motor operation) can be assured by adding an optional nonreverse backstop.

The reducers come in capacities from 1/3 to 75 hp with ratios from 5.00 to 47.4.

For further information, *write* U. S. Electrical Motors Inc., Box 2058, Terminal Annex, Los Angeles 54, Calif.

Vacuum Tempering Furnace Operates up to 1400° F

A VACUUM tempering furnace has been designed primarily to bright temper work previously heat treated



in Ipsen's VVFC-10x4 unit (so work does not have to be removed from the basket). It can also be used for annealing ferrous and nonferrous materials and for precipitation hardening.

The work space is 10 in. in diameter and 14 in. deep; operating pressure is 50 microns Hg; input is 9 kw; and maximum operating temperature is 1500° F. The furnace and vacuum system are housed in a single unit and take up a floor area of 42 x 48 in. The separate control panel with strip chart temperature recorder is 6 ft high and occupies an area of 13 x 24 in.

The unit works with any gas that is reducing, oxidizing, or inert. Internal water cooling coils and directional baffles permit rapid cooling of the circulating gas. The unit can be safely operated under partial pressures or full pressure with such gases as hydrogen, endothermic, cracked ammonia, or rich endothermic.

For further information, *write* Dept. 721, Ipsen Industries Inc., P. O. Box 500, Rockford, Ill.

Refractory Cement Can Be Applied in 1 in. Coatings

A READY mixed, air setting refractory cement (Super Blakite) for use over vertical boiler tubes has been developed. It can be applied from the container by a trowel.

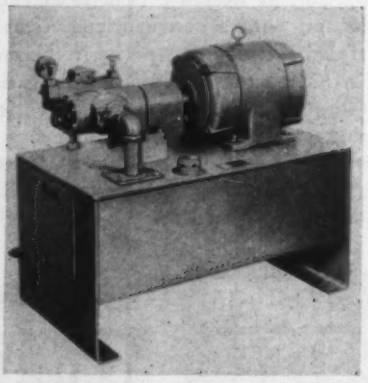
The company says workability, high strength, and good adhesion make it possible to apply the material to smooth metal plates that are directly overhead. Coatings 1 in. thick do not crack or dry when they are subjected to heat.

When the cement is thinned with water, it can be used for laying fire clay brick and superduty brick. It can also be used for shallow, cold patching of refractory masonry and for coating the inside surfaces of duct linings subjected to flue dust abrasion.

For further information, *write* Johns-Manville Corp., 22 E. 40th St., New York 16, N. Y.

Double Pump Power Units Produce 1000 and 2000 psi

A LINE of 1000 and 2000 psi, double pump, power units is offered in standard 30 and 60 gallon reservoir



sizes with combined pump capacities to 33 gpm.

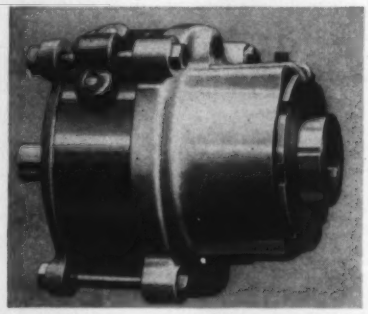
By using double pumps with the "Hi-Lo" unloading valve panel, horsepower requirements are reduced, oil temperatures are lowered, and maximum circuit efficiency is realized.

For further information, *write* Dept. 124, Hannifin Co., 501 S. Wolf Rd., Des Plaines, Ill.

Mounted Gear Reducer Saves Weight and Space

UP TO 50 per cent savings in weight and space are claimed for a new shaft mounted, planetary gear reducer.

It's available in steel or aluminum housings. The unit has ratios from



3½:1 to 36:1 and a horsepower range from 4 to 30. Higher ratios and horsepower are available in the company's standard, foot mounted units.

For further information, *write* Crichton Co., Johnstown, Pa.

Feeder Handles Cut Blanks, Coil Strip Interchangeably

KEEPING a press running at top productivity is the function of a Flexofeed unit made by Precision Welder & Flexopress Corp. It feeds cut blanks and coil strip interchangeably. The unit is supplied only as an option for Precision's Flexopresses.

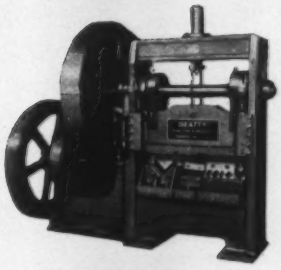
The units are designed to cover a range of feed lengths and speeds with accuracies to ±0.002 in. On some applications, coil stock can be fed at 2500 in. per minute, blanks as high as 300 per minute.

Besides providing tooling economy, the unit leaves the die area

MAJOR SAVINGS

are yours with the installation of

BEATTY GUILLOTINE BAR SHEARS!



BEATTY GUILLOTINE BAR SHEARS!

enable you to shear rounds . . . squares . . . angles . . . and bars . . . without changing tools . . . offering you important savings in shearing costs through the elimination of tool changing time on short-order runs of different steel shapes.

Suitable for either production or "short order" shearing, the Beatty Guillotine Bar Shears are available in capacities for handling 43 tons up to 300 tons. A range of nine models permits you to select the models best suited to the special metalworking needs of your plant.

When the objective is to cut metalworking production costs, it pays to investigate the Beatty family of metalworking equipment.

WRITE for FREE DESCRIPTIVE LITERATURE on the Beatty line of shears, punches, presses, bulldozers, spacing tables, and stamping trimmers.

BEATTY

MACHINE & MFG. COMPANY

913 150th St., Hammond, Indiana

completely clear so that changeover from one part to another and die change can be done quickly. Conventional tool design for forming and blanking at high speeds can be used without modification.

For further information, *write* Precision Welder & Flexopress Corp., 3518 Ibsen Ave., Cincinnati, Ohio.

Sliding Bolsters Cut Die Changeover Time

DIE CHANGEOVER time can be cut from hours to minutes with sliding bolsters available for Niagara's inclinable, straight side, and other presses.

The dies glide on an air cushion and can be quickly moved in and out of the working area. A power operated slide adjustment permits ready duplication of previous die settings. Hydraulically actuated die clamps maintain the clamping load mechanically in case of hydraulic or power failure.

For further information, *write* Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, N. Y.

Vibratory Finisher Features Controlled Orbital Motion

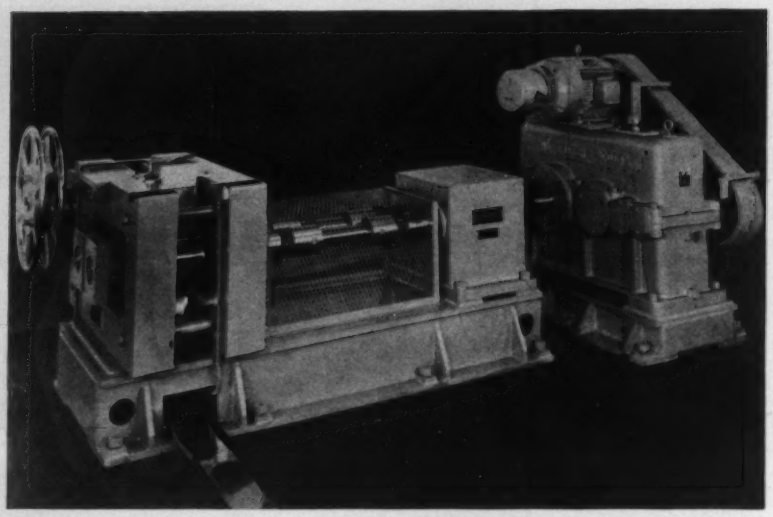
A VIBRATORY machine for precision tumble finishing features a controlled orbital motion. Cutting speed is said to be much faster than that of conventional methods, and tub life is reported to be longer.

The 1¼ cu ft Model 10 has a variable speed drive to permit orbital control of abrasive load.

For further information, *write* Rampe Mfg. Co., 14915 Woodworth Ave., Cleveland 10, Ohio.

Abrasive Developed for Precision Grinding Work

AN ABRASIVE called 23 Alundum handles jobs such as surfacing with abrasive segments. It combines friable, free cutting characteristics with good durability.



FINE METAL POWDER IS ROLLED INTO STRIP on the Model 1000 horizontal compacting mill. Green strip leaves the mill at speeds varying from 12½ to 50 ft per minute and is passed continuously into a protective atmosphere, sintering furnace. After a reduction on a two high, hot mill, the material goes to a conventional, four high, cold mill. An edge control protects sensitive strip edges. The unit can handle nickel, stainless steel, copper, and nuclear fuels. For further information, **write** Loma Machine Mfg. Co. Inc., 114 E. 32nd St., New York 16, N. Y.

The company says wheels and segments sell at nonpremium prices. Field test reports show that segments made from the material grind more pieces per dressing with less tendency to burn, and they give long life.

For further information, *write* Norton Co., Worcester 6, Mass.

Eddy Current Equipment Tests Nonferrous Metals

A SINGLE FREQUENCY, eddy current tester has been developed by Magnetic Analysis Corp. It uses an oscilloscope to indicate surface or subsurface flaws in nonferrous, nonmagnetic materials.

The company says the equipment is adaptable to production line service. Materials ⅛ to 3 in. in diameter can be inspected at speeds of 50 to 600 fpm.

Twenty-four plug-in coils adapt the equipment for interim sizes in ⅛ in. increments. False signals due to production machine vibration have been minimized, says the company. Signal response to flaws is maintained at a high level. An additional neon light on the oscilloscope panel provides a supplementary visual flaw indicator.

For further information, *write* Magnetic Analysis Corp., 42-44 Twelfth St., Long Island City 1, N. Y.

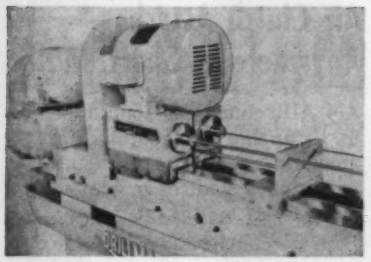
Gun Drilling Power Unit Can Do Production Work

A DUAL spindle, gun drilling, power unit will slash production time in half on certain operations, says Drillmation Co.

Work that lends itself to close center fixturing is ideal for the setup. Finished holes can be drilled from solid materials in one pass on a production basis. Diameter to length ratios as high as 288 to 1 are possible with a minimum runout of 0.0003 in. per inch.

The unit (Boremation Dual) maintains the same precision feeds and tolerances as the conventional, single spindle power units. It's available with hydraulic or "positive drive" mechanical transmission on the 12 and 24 in. strokes. A mechanical transmission is necessary for the 36, 48, and 60 in. units.

Feed rates infinitely variable to



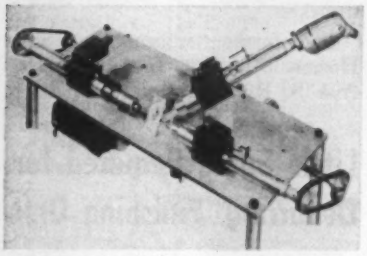
30 in. per minute can be co-ordinated to operate with spindle speeds up to 10,000 rpm.

For further information, *write* Drillmation Co., 6500 E. 11 Mile Rd., Center Line, Mich.

Angle, Off-Line Work Performed by Drill Unit

A DRILL unit with a capacity of ¼ in. in steel provides unlimited mounting flexibility to handle angle or off-line drilling jobs.

The unit incorporates a two way, air cylinder which provides both feed and spindle return. Any length stroke may be set up to the unit's 4 in. capacity.



The unit is designed to permit quick attachment to a flexible shaft or an electric motor. Standard accessories include mounting brackets, adapters, pulley drives, and offset universal joints.

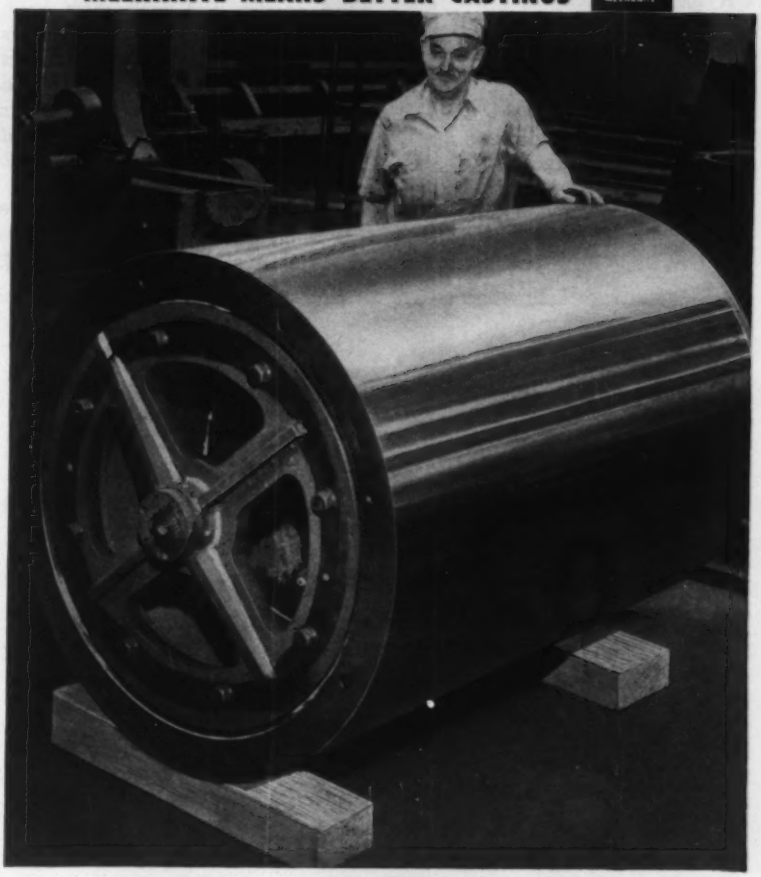
For further information, *write* Commander Mfg. Co., 4225 W. Kinzie St., Chicago, Ill.

Ceramics Hard as Carbides Resist Heat to 3000° F

A LINE of ceramics (Duramic HT-1 Series) has heat resistance to 3000° F. Hardness is in the carbide range, and dielectric strength goes up to 250 volts per mil.

The high aluminum oxide ceramics come in three grades: HT-

MEEHANITE MEANS BETTER CASTINGS®



Meehanite Mandrels Reduce Tooling Costs

This 44" diameter by 64" long cylindrical mandrel weighs 8000 lbs. and is used for hydrospinning high strength missile casings. Many such Meehanite mandrels are now being used with good results to form parts for airframes, aircraft engines, missiles and other industries.

If you are producing conical, cylindrical and contoured parts by the power spinning process, Meehanite mandrels, that are machined, heat-treated to a hardness of about 50 Rockwell C and ground, offer many design, economic and production advantages.

High quality Meehanite mandrels reduce tooling costs by combining dimensional accuracy, high strength, fine surface finish and long service life.

For more information, send for your free copy of our new brochure on Meehanite Mandrels. Write to Meehanite Metal Corporation, 714 North Avenue, New Rochelle, New York.

MEEHANITE METAL

MEEHANITE CASTINGS ARE MADE ONLY BY MEEHANITE FOUNDRIES.

1-A for high wear and moderate heat shock; HT-1-B for high heat shock and moderate wear; HT-1-C for extreme wear and moderate heat shock.

Compressive strengths go up to 400,000 psi. Suggested applications for the material include high temperature welding locators, RF heating jigs, gages, wire guides, wire drawing dies, brazing fixture components, high temperature furnace parts, nonmagnetic wear parts, chemical pump parts, welding shields, abrasive shields, abrasive nozzles, and valve seats.

Parts are available in diameters to 10 in. Standard size tolerances are as close ±0.005 in. as fired and can be ground to ±0.0001 in. Parts can be metallized for soft or hard soldering, or fastened with ceramic and epoxy cements.

For further information, *write* Duramic Products Inc., 426 Commercial Ave., Palisades Park, N. J.

WHEN you consider that *cleaning room costs* are a part of the cost of your product—anything that reduces these costs will automatically increase your profits. It is natural to be a skeptic when you read this statement: "National Metal's **Perma-Steel®** will last as long and clean as well as steel abrasives—and it costs substantially less."

But supposing it's true? Supposing we can prove it to you in your own operation without upsetting your routine? Supposing we CAN make an abrasive with controlled specifications? Supposing we CAN save you money? Being a skeptic is natural. Being obstinate can be costly. What's wrong with listening to our story?

If you are using chilled iron abrasives, we can prove that **New Controlled "T"®**—or **Permabrasive®** would sharply reduce your costs. Be a skeptic, but be an open-minded one. Write for National Metal's free booklet: "The Facts of Life Concerning the Use of Shot and Grit."

NATIONAL METAL ABRASIVE COMPANY
3560 NORTON ROAD • CLEVELAND 11, OHIO
Western Metal Abrasives Co. (affiliate) 101 E. Main Street, Chicago Heights, Ill.

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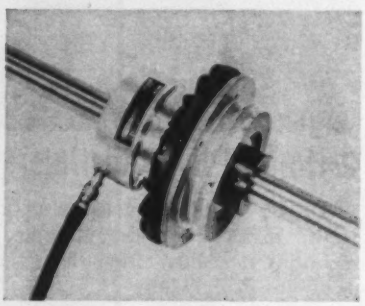
Los Angeles • Oakland • Seattle
THE FOUNDRY SUPPLY CO., INC.
Minneapolis

Air Clutch Attaches Anywhere on Shaft, Motor

AN AIR clutch for applications up to 10 hp has a mounting arrangement that permits attachment anywhere on a shaft or to a motor.

The unit is self-adjusting and is both a clutch and motor sheave. No rotary point is needed. It hooks to an air line. Control can be manual or automatic with special control panel attachment.



The manufacturer says the Model MW clutch provides shockless starts without overheating. It's made to hook up with 3V belts, or pilot mount for special sheaves and sprockets.

For further information, *write* Horton Mfg. Co. Inc., 1179 15th Ave. S. E., Minneapolis 14, Minn.

Little Space Required for Deburring, Finishing Unit

ONLY 4.8 sq ft of floor space are taken up by the Almco deburring and finishing machine (Model DB-1616). Total capacity of the two compartment barrel is 2 cu ft with each octagonal container measuring 8 x 16 in.

A single compartment barrel 16 in. long and 16 in. in diameter is available as optional equipment. Barrels are lined with ¼ in. abrasive resistant Plastisol.

The barrel is rotated by a ½ hp, 220/440 volt, 3 phase, 60 cycle motor with a manually operated switch (it has overload protectors). Speed is variable from 13 to 39 rpm.

For further information, *write* Queen Products Div., Almco, Precision Finishing, King-Seeley Corp., Albert Lea, Minn.

NEW Literature

Write directly to the company for a copy

Welding Thermoplastics

Detailed operating and maintenance instructions for welding thermoplastics such as polyethylene, polypropylene, and plasticized tank linings are presented in a 4 page manual (60-2). Kamlar Products Co., 932R Washington St., Norwood, Mass.

Alloy Steel Series

Two brochures describe Jalloy-S and Jalloy-AR. Jalloy-S is the constructional series. The other is the abrasion resistant series. Tables list chemical and mechanical properties plus selected engineering information. Jones & Laughlin Steel Corp., Pittsburgh, Pa.

Roller Chain Catalog

A roller chain catalog (No. 760) includes horsepower ratings developed by the membership of the Association of Roller & Silent Chain Manufacturers. Diamond Chain Co. Inc., 402 Kentucky Ave., Indianapolis 7, Ind.

Computer Application

A nine page report describes the application of the Dystac, dynamic storage analog computer to the determination of complex chemical equilibrium conditions and composition. The equilibrium evaluations help optimize such variables as feed temperature and operating pressure in chemical process development. Computer Systems Inc., Culver Road, Monmouth Junction, N. J.

Exhaust Purifiers

Case histories showing different applications for a catalyst exhaust purifier are described in a 4 page booklet. Oxy-Catalyst Inc., Berwyn, Pa.

Manganese

A 26 page booklet contains information on the nature, sources, and markets of manganese. Nonmetallurgical uses are discussed. Advertising Dept., E. J. Lavino & Co., 3 Penn Center Plaza, Philadelphia 2, Pa.

Lubricants Data

"Lubricants for Aluminum Working," 20 pages, recommends lubricants for 19 metalworking operations. Dept. PRD-40, Reynolds Metals Co., Box 2346, Richmond 18, Va.

Gas Proportioners

Recently developed gas proportioner systems, which mix various gases at the point of application rather than having them mixed by the supplier, are diagramed and discussed in Information Report No. 20. National Cylinder Gas Div., Chemetron Corp., 840 N. Michigan Ave., Chicago 11, Ill.

ABRASION RESISTANCE

A CASE IN POINT—Under highly abrasive conditions dust and fly ash collector tubes such as these used to give out in less than a year. Ni-Hard castings were an obvious yet difficult answer because the 38" length with 5/16" section was hard to cast. Where others failed Hamilton Foundry succeeded in casting these in production quantities for Western Precipitation Multiclones. The hardness (up to 700 Brinell) and metallurgical structure of Ni-Hard make it one of the most abrasion resistant materials commercially available today. Tubes from Hamilton Foundry Ni-Hard now last more than five times as long as before.

When buying castings, the skill and integrity of Hamilton Foundry is your best insurance that specifications—and delivery schedules—will be met.

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Small Gains Seen for January

LOOK FOR a 5 to 10 per cent improvement in steel output and shipments this month.

The trend can only be upward after a December that saw production drop to 5.8 million ingot tons (smallest of any month last year) and operations skid to the lowest level for a nonstrike period since 1940.

The upturn will be partly artificial—stemming from the release of some December orders that were held up because of yearend taxes and financial statement considerations. It will also reflect a post-holiday pickup in consumption. But not of the size that's needed to spark the industry's recovery. STEEL estimates ingot production in the week ended Jan. 7 rose 17.9 per cent to 1.3 million net tons from the 1,103,000 tons reported the preceding week. Reports to STEEL indicate a slight rise in the week ended Jan. 14 is likely.

NOTHING SPECTACULAR—There's nothing in view to suggest that steelmaking operations are going to pick up rapidly. Consumers are buying more actively than they did last month, but they're still intent on keeping their inventories at a minimum. In some quarters, liquidation is continuing.

OUTLOOK BY QUARTERS—A review of the fourth quarter shows that steel industry operations averaged 50.4 per cent of capacity—54.6 per cent in October, 50.6 per cent in November, and 46 in December.

Assuming little change in the industry's 1961 capacity, first quarter operations will probably average about 55 per cent—50 in January, 55 in February, and 60 in March. Look for ingot rates to average 63 per cent in the second quarter, 58 in the third, and 70 in the fourth.

Output by quarters: 21 million tons, 24 million, 22 million, and 26 million. That's a conservative forecast—only 93 million tons for the year. Production could be closer to 100 million if there's a strong fourth quarter.

STEELMAKERS WARY—In sizing up prospects for 1961, steel industry leaders have been unusually cautious. Excerpts from yearend statements:

Roger M. Blough, chairman, U. S. Steel Corp.: "Inventories are now estimated to be about as low as they can be expected to go. Prospects, therefore, . . . appear better than they have been for some time."

Arthur B. Homer, chairman, Bethlehem Steel Co.: "I am confident that the level of Bethlehem's operations will start rising before long and that we can look forward to a reasonably satisfactory year."

Thomas F. Patton, president, Republic Steel Corp.: "We foresee a moderate improvement in steel operations in the first and second quarters of 1961, with the year ending on an upward trend."

A. S. Glossbrenner, president, Youngstown Sheet & Tube Co.: "We believe that the worst is over, and we will move forward, slowly but steadily, through the first half of the year. Operations toward the end of the year should then increase more rapidly."

EQUIPMENT TO GAIN?—This year will be a good one for makers of farm and construction equipment, predicts R. S. Stevenson, president, Allis-Chalmers Mfg. Co., Milwaukee. His reasons:

- Gross farm income will at least equal last year's. Granted reasonable weather, farmers should return to normal equipment purchasing patterns, and dealers will bring their inventories up to usual levels.
- Highway construction should be substantially greater. This should stimulate construction machinery buying, and distributors will need larger floor stocks.

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Metalworking Week—Page 17 Technical Outlook—Page 59

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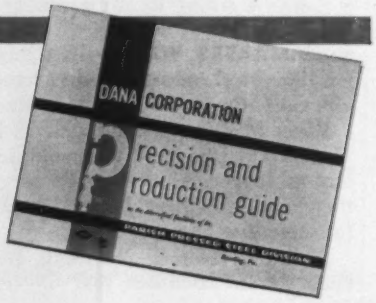

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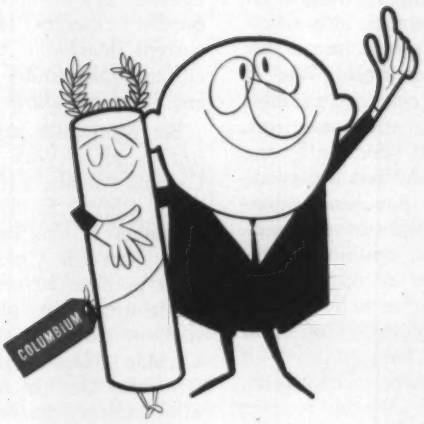


Columbium Hailed as Real Comer

BECAUSE OF columbium's wide diversity of properties, the pencil gray metal that was largely a laboratory curiosity until after 1950 is being studied for uses ranging from carbon steelmaking to spaceships that could skyrocket demand within a few years.

• **Earliest Potential** — Columbium appears to have a bright future both in metallic form and as an alloy in steelmaking. The latter use seems to have the strongest prospects for bringing columbium its first large poundage market.

Ferrocolumbium and ferrotantalum-columbium have been used for years as stabilizers in stainless steels to prevent carbide precipitation in the 800 to 1600° F temperature range. Now there's a strong possibility those alloys will find a wide scale, similar use in carbon steelmaking. Addition of ½ to 1 lb of columbium per ton of steel sharply boosts yield strength and stabilizes the carbon. The advantage, says Molybdenum Corp. of America, is that the greater strength permits designers to save up to 35 per cent in weight compared with regular carbon steels.

Columbium alloy steel is getting most attention from makers of line pipe, storage tanks of all types, special structurals, reinforcing bars, and flat rolled products for such auto industry applications as bumpers. Another potential: Plates for submarine hulls and deck superstructures.

If use in carbon steel should become widespread, potential would be enormous. Union Carbide Metals Co., a division of Union Carbide Corp., envisions applications of columbium treated steel totaling 10 million ingot tons. If but ½ lb of columbium were added to each ton, this would create a market for 5 million lb of the metal, more than five times present total annual consumption.

• **Farther Ahead** — Columbium's real forte may lie in its use in metallic form, but any large scale application is several years distant. Demand for columbium metal and mill products in 1960 was about 200,000 lb, a 50 per cent gain over 1959.

This year should show about another 50 per cent increase.

Most of the metal today goes into laboratory and experimental work, mainly in the nuclear energy and high temperature fields. "Every future nuclear reactor using liquid metal as a coolant will have to use columbium," says K. C. Li Jr., vice president, Wah Chang Corp., leading producer. Reason: It combines a number of unique properties and characteristics ideally suited to nuclear and other high temperature applications. Columbium can take temperatures over 1700° F before corrosion sets in. "On a strength-weight basis, columbium gives the best performance of all metals at temperatures of from 2000 to 2500° F," says Dr. Edward Epremian, technical co-ordinator, Union Carbide Metals Co. Columbium has low neutron absorbing properties, the ability to form a fuel alloy with uranium, good resistance to corrosion by some liquid metals and gases, moderately good resistance to acid corrosion and oxidation, and a melting point of 4400° F. It's also easy to fabricate.

One of columbium's earliest markets may be in jet aircraft engines. Present constructional materials are good only to temperatures of

1800 to 2000° F. It's no secret many aircraft people feel today's engines are underdesigned. In fact, a crash program is underway to boost safe operating limits for engines to 2400° F. "Manufacturers will have to go to columbium alloys for combustion chambers, turbine blades, and other 'hot parts,'" says Mr. Li.

• **Out of This World**—"Any future space vehicle, satellite, or missile will have to use columbium," believes Mr. Li. Reason: Because of its strength at high temperatures and corrosion resistance. Uses could include a variety of structural parts—even the skin. It's possible the metal may go into nozzles of liquid propellent rocket motors.

Another distinct possibility is the metal's use in gas turbine engines designed for stationary power applications and heavy construction equipment. Also possible: Columbium instead of tantalum for capacitors (in certain well defined performance ranges). A future market might be in corrosion resistant equipment for the chemical industry.

Even if a variety of uses should burst forth overnight, there's no possibility, even remote, of a shortage. That wasn't true just a few years ago. During World War II and the Korean conflict, columbium, considered a strategic metal, was controlled and allocated by the government. In the last few years, exploration work has been extensive. And the results have exceeded even the most optimistic forecasts. One mine in Brazil alone has indicated reserves of 7.5 billion lb of contained columbium, and that's just the initial estimate—it could be two or three times greater.

Estimated Free World reserves are between 20 billion and 30 billion lb. Principal deposits are in Brazil, Nigeria, Norway, and Canada (the U. S. has deposits but is not a major miner). "Columbium is abundant, available and accessible," says Mr. Li. "I think one day we will have as much of it as copper."

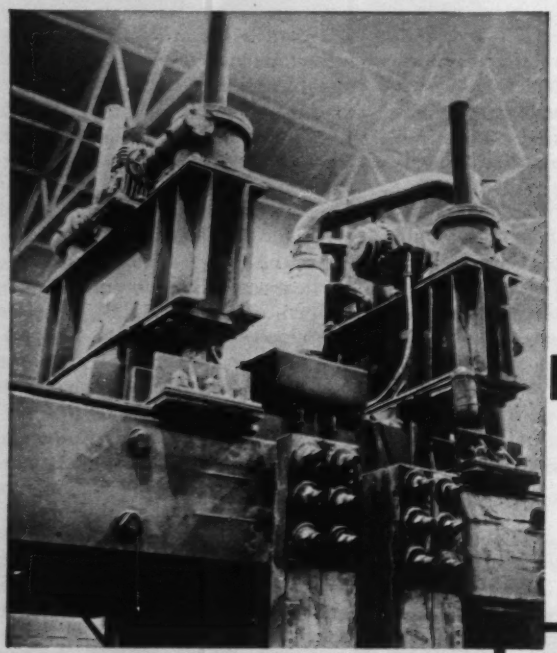
• **Plenty of Capacity**—Data on U. S. capacity to turn the imported ores into metal, alloys, and mill shapes are secret, as are any meaningful production and consumption figures. It's no secret though that present capacity far outdistances current demand. And existing facilities could double or triple present capacity within 60 days.

Six companies produce columbium metal: Wah Chang, Union Carbide Metals, Fansteel Metallurgical Corp., E. I. du Pont de Nemours & Co. Inc., Kennametal Inc., Kawecki Chemical Co. Inc. Four produce ferrocolumbium: Molybdenum Corp. of America, Vanadium Corp. of America, Union Carbide Metals, and Reading Chemical Co. In addition, Shieldalloy Corp. markets both metal and ferrocolumbium produced in Germany.

• **Price Outlook**—As better extraction methods are developed and demand rises, the price of columbium will come down. Presently, columbium costs $50 to $55 a pound and up for the primary forms: Rondles, ingots, powder, refined ingots. Both the price and availability of mill products (rods, sheets, wire, strip) are on an order-to-order basis. The price of ferrocolumbium, at $3.45 a pound, looks stable for the immediate future.

When present demand triples, the price will probably be cut about in half. When sales reach four or five times their present level, producers estimate quotations could drop to about $10 or $12 a pound. That won't be any time soon. While there are too many "maybes" to accurately forecast when the big upswing for the metal will come, five years seems like a pretty good guess.

• **Technical Troubles**—One determining factor will be how soon metallurgists can find answers to some tricky problems. A lot has yet to be learned about making mill products (the government is working on a refractory metals sheet rolling program). Most necessary is to develop a coating (or an alloy) that will prevent oxidation at high temperatures (without affecting ductility and fabricability), particularly if heavy penetration of the missile and jet engine field is to be made. Columbium men think that day is not far off.



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Youngstown Official Sees Modest Upturn Underway

Encouraging signs of a modest upturn in steel buying are seen by A. S. Glossbrenner, president, Youngstown Sheet & Tube Co., Youngstown. He thinks the worst is over and expects a slow but steady forward movement through the first half. Buying and operations toward the end of the year will go up more rapidly, he says, in predicting 1961 steel production of around 100 million net tons.

New business now coming to the company includes orders for flat rolled products, both hot and cold rolled sheets and strip. Some is being received from autobuilders. Canmakers are ordering tin plate, and a modest upturn in pipe sales is noted.

Youngstown Sheet & Tube's expansion program will put it in a stronger position to compete for available markets with domestic and foreign producers, says Mr. Glossbrenner. The program is broadening the company's product mix and raising the efficiency of its facilities.

Steel Bars . . .

Bar Prices, Page 98

Demand for merchant steel bars for first quarter shipment is reported improved slightly at several points. In general, though, volume is small, and no spurt is in sight. Most sellers anticipate a slow, steady climb in business over the first quarter.

Some of the current slight pick-up in ordering reflects demand for alloy bars on armament contracts. In the South, sellers report their December volume was about 20 per cent above that in November.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 99 & 100

Indications are that January production and shipments will register a 10 per cent improvement over December's. The outlook is based on tonnage now on producers' books, and expectations are that February will see extension of the improvement.

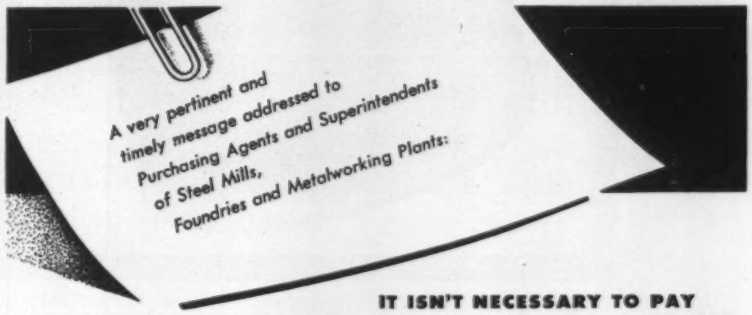
It now appears doubtful that automobiles will be the pace setter in the improved demand for steel during the first quarter. Right now, it's difficult to tag any given industry as the one to lead the parade. However, there are encouraging signs in several lines, including earthmoving machinery.

Some important consumers anticipate that each succeeding month will see steel requirements expand, and they point out that inventories have been reduced to a point where improvement in business will require a corresponding increase in steel purchases. But major buying is still hand to mouth.

In some cases, revised orders for sheets are being placed for the first quarter.

Alloy Steel . . .

Alan Wood Steel Co., Conshohocken, Pa., has discontinued marketing its low alloy, high strength steel known as Dynalloy 11, but is continuing to offer Dynalloy 50, formerly known as Dynalloy 1. The company is also continuing



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- Position power wrench so that socket fits straight on nut. Tilted wrench causes binding and socket breakage.
- Use right size socket . . . replace worn or undersize nuts. Loose-fitting sockets wear faster — then break.
- Don't keep impacting after nut is tightly set. This causes needless wear on both wrench and socket.
- Keep the inside of sockets clean. Dirt and grease are common causes of socket breakage.
- When power wrench drive head becomes worn — replace it. Loose drive causes excess wear in socket drive opening — early socket breakage.

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Service Centers Revert To Old Pricing System

With two leading steel service center chains (U. S. Steel Supply and Joseph T. Ryerson & Son Inc.) abandoning the system of item and quantity extras at a number of Midwest points, it's expected the action will become general.

The item and quantity extra system, put into effect in mid-1959, will give way at Chicago, Indianapolis, Milwaukee, Detroit, St. Louis, and Cleveland, to the former pricing system.

The change, effected just after the Christmas holiday, results in an average reduction of $1 to $2.17 per ton and is described as a move to meet competition.

Under the pricing system being restored, discounts are determined only by the total size of an order, not by a combination of total order size and items. All customers ordering 20,000 lb at a time, it's understood, will get the same discount now whether the order consists of one or a dozen items.

The biggest reduction is expected on large orders made up of many small items.

Distributors . . .

Prices, Page 103

Many distributors are optimistic about prospects for 1961. Service centers in the Los Angeles area are especially optimistic as a result of strong December sales—they were as much as 15 per cent heavier, seasonally adjusted, than November's. Gross profits have also increased.

Orders placed with mills will continue to be based on short term sales figures because of taxes on stock in inventory as of Mar. 1. Still the strongest items in most districts: Those used for the building trades, including reinforcing bars, wire, and structurals.

Tubular Goods . . .

Tubular Goods Prices, Page 102

While production of buttweld pipe is curtailed, it's estimated shipments are moving from the mills at about 50 per cent of normal.

Stocks are ample, and demand is not expected to show much life until requirements for building and construction spurt in the spring.

An order for about 30 miles of large diameter line pipe for Trunkline Gas Co., subsidiary of the Panhandle Eastern Pipe Line Corp., is being expedited through Kaiser Steel's pipe mill at Napa, Calif., to meet tight construction schedules.

Tin Plate . . .

Tin Plate Prices, Page 100

Canmakers have started to release tin plate orders for delivery early this year. Producers now think the can companies are going to be pretty good buyers during the early part of the year. A gain of from 5 to 10 per cent in volume is estimated in some quarters.

Plates . . .

Plate Prices, Page 98

Plate fabricators are estimating numerous small volume tonnage jobs, and price competition is reported notably severe. That's particularly true at some points, notably in New England, where shops are operating on narrow profit margins and placing orders with the mills in line with new bookings.

With the exception of some tankbuilders, fabricating shops are reported plodding along with small steel inventories.

Inquiry is reported improved in the Pacific Northwest. Chicago Bridge & Iron Co. has booked a watertank project at Portland, Oreg., involving 900 tons of plates. An award of 1000 tons or more, involved in a Vancouver, Wash., tankfarm, is pending.

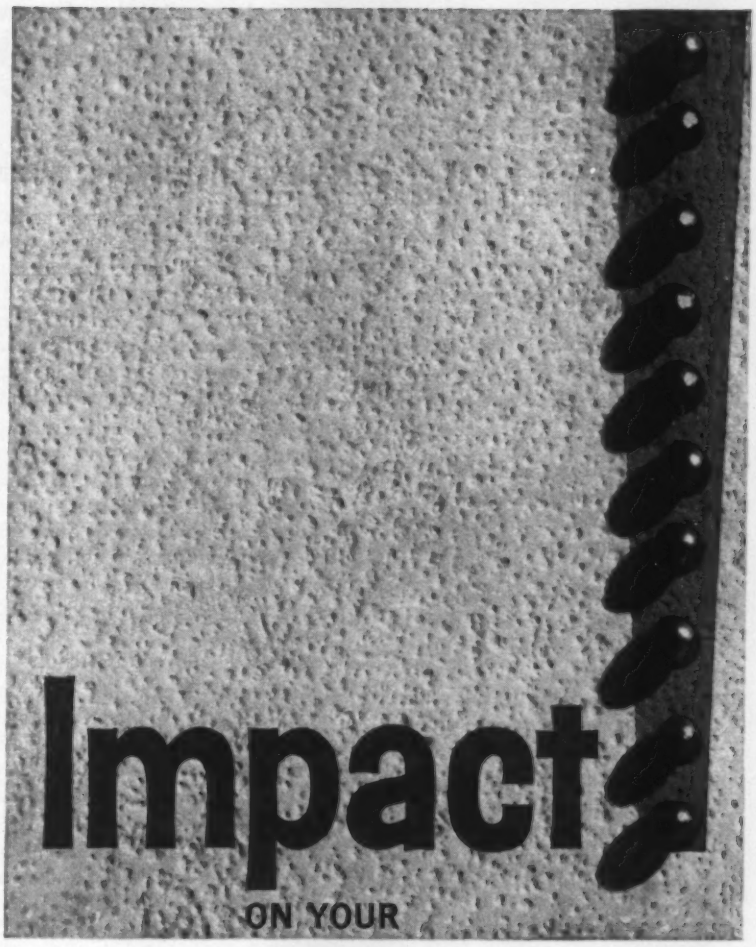
Wire . . .

Wire Prices, Pages 100 & 101

While producers of wire specialties enter the new year with slim order backlogs, it's thought that demand hit bottom in the fourth quarter and that many consumers will step up their buying during the next few weeks.

Users of manufacturers' wire, springs, and other wire products have permitted their inventories to fall considerably below normal.

A medium size producer in the Pittsburgh area reports its 1960 sales were slightly higher than its 1959



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volume. This year, business will revert to the usual seasonal pattern — slow in the first quarter, better in the second, off in the third, and up sharply in the fourth. Last year, first quarter sales were exceptionally brisk because the 116 day strike in the second half of 1959 had depleted consumer inventories.

Rails, Cars . . .

Track Material Prices, Page 101

Atchison, Topeka & Santa Fe Railway will trim its 1961 capital expenditures program to $65 million from $100 million. The $65 million figure represents all the improvements for which funds are expected to be available.

The program includes 37 miles of new main line in the Phoenix area compared with a 44 mile main line change on the transcontinental route in 1960. The freight car purchase program includes 1750 units compared with 1975 in 1960. However, more cars may be ordered during the year.

General American Transportation Corp., Chicago, announces that Trailer Train Co. has ordered 50 G-85 flatcars designed for use in piggyback operations. The cars are the first made by General American in Trailer Train's fleet of more than 2600 units. Delivery of the cars will start in mid-January. They will be built in the company's East Chicago shops and delivered at the rate of eight cars a day.

Steel Ingot Output Headed Higher This Week

STEEL estimates ingot production rose about 17.9 per cent in the week ended Jan. 7, to about 1.3 million net tons. That compares with output of 1,103,000 tons in the preceding week and 1,325,000 tons in the week ended Dec. 24, as officially reported by the American Iron & Steel Institute.

District reports to STEEL indicate a further rise in production is likely during the week ended Jan. 14.

The American Iron & Steel Institute's preliminary report shows 1960 output at 99,260,000 tons, 6.2 per cent over the 1959 total of 93,446,132 tons.

STEEL's district editors report:

• **Pittsburgh**—Output for the week ended Jan. 7 is estimated at about the same level as before the slowdowns for the yearend holidays. A further gain is expected for the current period.

• **Philadelphia**—The upturn in ingot operations which got underway last week following the letdown over the holidays is expected to continue for at least a couple of weeks. Demand for steel products continues on a spot basis, with deliveries still easy. The Laos crisis is causing some consumers to review their inventory situation, but it has not influenced buying.

• **Chicago**—Production in this district is estimated at the highest level in two months. Mills are anticipating improved shipments during the early part of the new year. During the final two weeks of the year, shipments were reduced and irregular because of holiday closings at consuming plants.

• **Buffalo**—Steel mills are holding operations at a steady level and are expected to continue to do so throughout January.

• **Youngstown**—Mills resumed operations at about the same level that prevailed prior to the sharp drop for the week between the Christmas and New Year holidays.

• **Cleveland** — Steelmaking operations returned last week to the preholiday level and are expected to hold fairly steady throughout the current month.

• **Detroit**—Operations here are unchanged and steady. A gradual improvement is looked for.

• **Birmingham**—Production was not curtailed here for the holidays as much as it was in most districts. The rate of operations is steady.

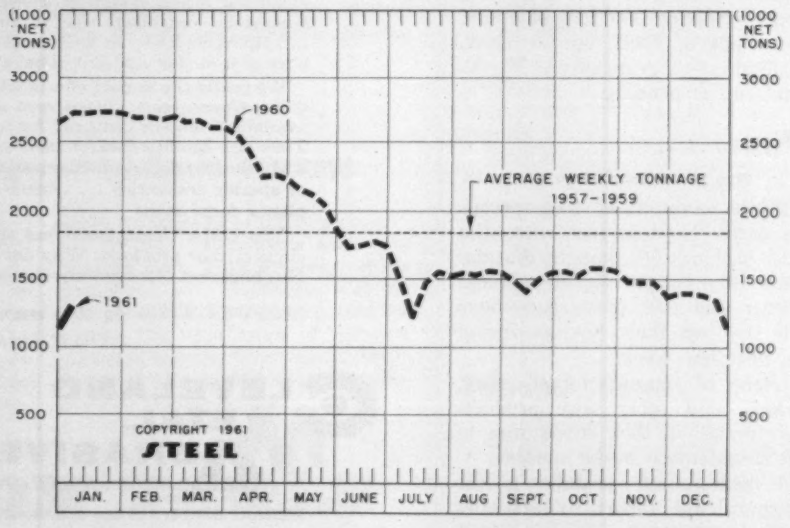
• **Los Angeles**—Mills resumed production at the preholiday rate and are expected to maintain that tonnage output for the current week.

STEEL INGOT PRODUCTION

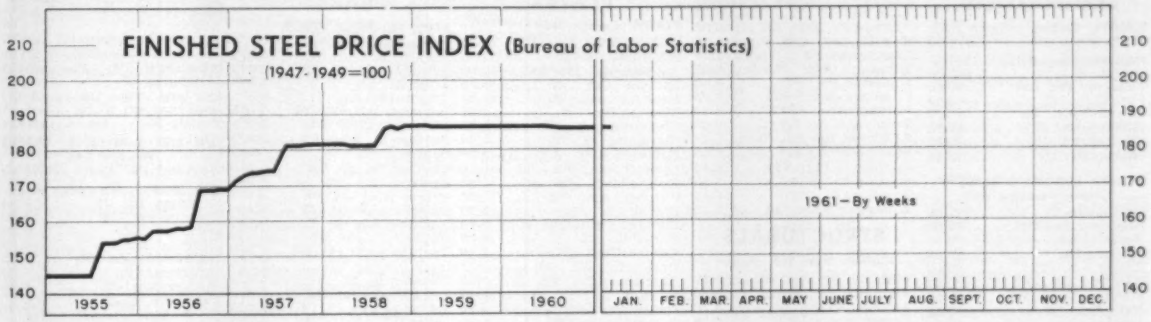
Weeks Ended	Net Tons	Change
Jan. 7	1,300,000*	+17.9%
Dec. 31	1,103,000	−16.8%
Dec. 24	1,325,000	− 4.5%
Totals		
1960	99,260,000†	+ 6.2%
1959	93,446,132	

INDEX BY DISTRICTS 1957-1959=100	—Weeks Ended— Dec. 31	Dec. 24
Northeastern	52	....
Buffalo	54	....
Pittsburgh	49	....
Youngstown	38	....
Cleveland	52	....
Detroit	68	....
Chicago	75	....
Cincinnati	72	....
St. Louis	57	....
Southern	65	....
Western	81	....
Total Industry	59.2	....

*Estimated by STEEL. †Preliminary.



Price Indexes and Composites



Jan. 3, 1961	Week Ago	Month Ago	Dec. Index	Year Ago
186.2	186.2	186.2	186.2	186.8

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Jan. 3

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825
Rails, Light, 40 lb	7.292
Tie Plates	6.875
Axles, Railway	10.175
Wheels, Freight Car, 33 in. (per wheel)	62.000
Plates, Carbon	6.350
Structural Shapes	6.167
Bars, Tool Steel, Carbon (lb)	0.560
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400
Bars, Tool Steel, H.R. Alloys, High Speed, W18 Cr 4, V 1 (lb)	1.895
Bars, H.R., Alloy	10.775
Bars, H.R., Stainless, 303 (lb)	0.543
Bars, H.R., Carbon	6.675
Bars, Reinforcing	6.335
Bars, C.F., Carbon	10.710
Bars, C.F., Alloy	14.125
Bars, C.F., Stainless, 302 (lb)	0.570
Sheets, H.R., Carbon	6.350
Sheets, C.R., Carbon	7.300
Sheets, Galvanized	8.775
Sheets, C.R., Stainless, 302 (lb)	0.658
Sheets, Electrical	12.625
Strip, C.R., Carbon	9.489
Strip, C.R., Stainless, 430 (lb)	0.480
Strip, H.R., Carbon	6.250
Pipe, Black, Buttweld (100 ft)	19.495
Pipe, Galv., Buttweld (100 ft)	23.098
Pipe, Line (100 ft)	195.430
Casing, Oil Well, Carbon (100 ft)	201.080
Casing, Oil Well, Alloy (100 ft)	315.213
Tubes, Boiler (100 ft)	51.200
Tubing, Mechanical, Carbon (100 ft)	27.005
Tubing, Mechanical, Stainless, 304 (100 ft)	194.268
Tin plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
Black Plate, Canmaking Quality (95 lb base box)	7.900
Wire, Drawn, Carbon	10.575
Wire, Drawn, Stainless, 430 (lb)	0.665
Bale Ties (Bundles)	7.647
Nails, Wire, 8d Common	9.433
Wire, Barbed (80-rod spool)	8.414
Woven Wire Fence (20-rod roll)	21.003

STEEL's FINISHED STEEL PRICE INDEX

	Jan. 4 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	247.82	247.82	247.82	247.82	208.90
Index in cents per lb	6.713	6.713	6.713	6.713	5.659

STEEL's ARITHMETICAL PRICE COMPOSITES

	Jan. 4 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$127.68
No. 2 Fdry, Pig Iron, GT	66.49	66.49	66.49	66.49	58.99
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	58.49
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	59.77
Steelmaking Scrap, GT	31.00	29.33	28.67	41.33	52.17

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Jan. 4 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	4.65
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	4.65
Bars, H.R., deld., Philadelphia	5.97	5.97	5.97	5.975	4.90
Bars, C.R., Pittsburgh	7.65*	7.65*	7.65*	7.65*	5.90
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	4.60
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	4.60
Shapes, deld., Philadelphia	5.745	5.745	5.745	5.77	4.88
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.50
Plates, Chicago	5.30	5.30	5.30	5.30	4.50
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	4.80
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.50
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	4.80
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.325-5.425
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	5.85
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	6.25
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	6.25-6.35
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	6.35
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	6.25
Nails, Wire, nonstock, Pitts.	8.95	8.95	8.95	8.95	7.60
Tin Plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.45

*Including 0.35c for special quality.

SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$84.50
Wire rods, ½-⅝" Pitts.	6.40	6.40	6.40	6.40	5.025

PIG IRON, Gross Ton	Jan. 4 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$59.50
Basic, Valley	66.00	66.00	66.00	66.00	58.50
Basic, deld., Philadelphia	70.18	70.18	70.18	70.41	62.16
No. 2 Fdry, Neville Island, Pa.	66.50	66.50	66.50	66.50	59.00
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	59.00
No. 2 Fdry, deld., Phila.	70.68	70.68	70.68	70.91	62.66
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	55.00
No. 2 Fdry (Birm.), deld., Cin.	70.20	70.20	70.20	70.20	62.70
Malleable, Valley	66.50	66.50	66.50	66.50	59.00
Malleable, Chicago	66.50	66.50	66.50	66.50	59.00
Ferromanganese, net tons†	245.00	245.00	245.00	245.00	190.00

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$29.50	$26.50	$26.50	$41.50	$51.00
No. 1 Heavy Melt, E. Pa.	35.00	35.00	34.00	42.00	55.00
No. 1 Heavy Melt, Chicago	28.50	26.50	25.50	40.50	50.50
No. 1 Heavy Melt, Valley	30.50	26.50	26.50	44.50	57.50
No. 1 Heavy Melt, Cleve.	26.50	23.50	23.50	41.50	54.50
No. 1 Heavy Melt, Buffalo	23.50	23.50	23.50	37.50	45.50
Rails, Rerolling, Chicago	53.50	48.50	46.50	61.50	72.50
No. 1 Cast, Chicago	38.50	37.50	36.50	54.50	51.50

COKE, Net Ton					
Beehive, Furn., Connlsvl	$15.00	$15.00	$15.00	$15.00	$14.125
Beehive, Fdry., Connlsvl	18.25	18.25	18.25	18.25	16.50
Oven, Fdry., Milwaukee	32.00	32.00	32.00	32.00	27.50

Steel Prices

Mill prices as reported to STEEL, Jan. 4, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 99; footnotes, page 101.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)
Munhall,Pa. U5 ....$76.00

INGOTS, Alloy (NT)
Detroit S41 ....$82.00
Economy,Pa. B14 ....82.00
Farrell,Pa. S3 ....82.00
Lowellville,O. S3 ....82.00
Midland,Pa. C18 ....82.00
Munhall,Pa. U5 ....82.00
Sharon,Pa. S3 ....82.00

BILLETS, BLOOMS & SLABS
Carbon Rerolling (NT)
Bartonville,Ill. K4 ...$82.00
Bessemer,Pa. U5 ....80.00
Buffalo R2 ....80.00
Clairton,Pa. U5 ....80.00
Ensley,Ala. T2 ....80.00
Fairfield,Ala. T2 ....80.00
Fontana,Calif. K1 ....90.50
Gary,Ind. U5 ....80.00
Johnstown,Pa. B2 ....80.00
Lackawanna,N.Y. B2 ..80.00
Munhall,Pa. U5 ....80.00
Owensboro,Ky. G8 ....80.00
S.Chicago,Ill. R2, U5 ..80.00
S.Duquesne,Pa. U5 ....80.00
Sterling,Ill. N15 ....80.00
Youngstown R2 ....80.00

Carbon, Forging (NT)
Bessemer,Pa. U5 ....$99.50
Buffalo R2 ....99.50
Canton,O. R2 ....102.00
Clairton,Pa. U5 ....99.50
Conshohocken,Pa. A3 .104.50
Ensley,Ala. T2 ....99.50
Fairfield,Ala. T2 ....99.50
Farrell,Pa. S3 ....99.50
Fontana,Calif. K1 ....109.00
Gary,Ind. U5 ....99.50
Geneva,Utah C11 ....99.50
Houston S5 ....104.50
Johnstown,Pa. B2 ....99.50
Lackawanna,N.Y. B2 ..99.50
LosAngeles B3 ....109.00
Midland,Pa. C18 ....99.50
Munhall,Pa. U5 ....99.50
Owensboro,Ky. G8 ....99.50
Seattle B3 ....109.00
Sharon,Pa. S3 ....99.50
S.Chicago R2, U5, W14 .99.50
S.Duquesne,Pa. U5 ...99.50
S.SanFrancisco B3 ...109.00
Warren,O. C17 ....99.50

Alloy, Forging (NT)
Bethlehem,Pa. B2 ...$119.00
Bridgeport,Conn. C32 .119.00
Buffalo R2 ....119.00
Canton,O. R2, T7 ....119.00
Conshohocken,Pa. A3 .126.00
Detroit S41 ....119.00
Economy,Pa. B14 ....119.00
Farrell,Pa. S3 ....119.00
Fontana,Calif. K1 ....140.00
Gary,Ind. U5 ....119.00
Houston S5 ....124.00
Ind.Harbor,Ind. Y1 ....119.00
Johnstown,Pa. B2 ....119.00
Lackawanna,N.Y. B2 .119.00
LosAngeles B3 ....139.00
Lowellville,O. S3 ....119.00
Massillon,O. R2 ....119.00
Midland,Pa. C18 ....119.00
Munhall,Pa. U5 ....119.00
Owensboro,Ky. G8 ....119.00
Seattle(6) B3 ....140.00
Sharon,Pa. S3 ....119.00
S.Chicago R2,U5,W14 .119.00
S.Duquesne,Pa. U5 ....119.00
Struthers,O. Y1 ....119.00
Warren,O. C17 ....119.00

ROUNDS, SEAMLESS TUBE (NT)
Buffalo R2 ....$122.50
Canton,O. R2 ....125.00
Cleveland R2 ....122.50
Gary,Ind. U5 ....122.50
S.Chicago,Ill. R2,W14 .122.50
S.Duquesne,Pa. U5 ...122.50
Warren,O. C17 ....122.50

SKELP
Aliquippa,Pa. J5 ....5.05
Benwood,W.Va. W10 ....5.05
Ind.Harbor,Ind. Y1 ....5.05
Munhall,Pa. U5 ....5.05
Pittsburgh J5 ....5.05
Warren,O. R2 ....5.05
Youngstown R2, U5 ....5.05

WIRE RODS
AlabamaCity,Ala. R2 ..6.40
Aliquippa,Pa. J5 ....6.40
Alton,Ill. L1 ....6.60
Bartonville,Ill. K4 ....6.50
Buffalo W12 ....6.40
Cleveland A7 ....6.40
Donora,Pa. A7 ....6.40
Fairfield,Ala. T2 ....6.40
Houston S5 ....6.65
IndianaHarbor,Ind. Y1..6.40
Johnstown,Pa. B2 ....6.40
Joliet,Ill. A7 ....6.40
KansasCity,Mo. S5 ....6.65
Kokomo,Ind. C16 ....6.50
LosAngeles B3 ....7.20
Minnequa,Colo. C10 ....6.65
Monessen,Pa. P7 ....6.40
Pittsburg,Calif. C11 ....7.20
Portsmouth,O. P12 ....6.40
Roebling,N.J. R5 ....6.50
S.Chicago,Ill. R2, W14..6.40
SparrowsPoint,Md. B2 ..6.50
Sterling,Ill.(1) N15 ....6.40
Sterling,Ill. N15 ....6.50
Struthers,O. Y1 ....6.40
Worcester,Mass. A7 ....6.70

STRUCTURALS

Carbon Steel Std. Shapes
AlabamaCity,Ala. R2 ...5.50
Aliquippa,Pa. J5 ....5.50
Atlanta A11 ....5.70
Bessemer,Ala. T2 ....5.50
Bethlehem,Pa. B2 ....5.55
Birmingham C15 ....5.50
Clairton,Pa. U5 ....5.50
Fairfield,Ala. T2 ....5.50
Fontana,Calif. K1 ....6.30
Gary,Ind. U5 ....5.50
Geneva,Utah C11 ....5.50
Houston S5 ....5.60
Ind.Harbor,Ind. I-2, Y1.5.50
Johnstown,Pa. B2 ....5.55
Joliet,Ill. P22 ....5.50
KansasCity,Mo. S5 ....5.60
Lackawanna,N.Y. B2 ..5.55
LosAngeles B3 ....6.20
Minnequa,Colo. C10 ....5.80
Munhall,Pa. U5 ....5.50
Niles,Calif. P1 ....6.25
Phoenixville,Pa. P4 ....5.55
Portland,Oreg. O4 ....6.25
Seattle B3 ....6.25
S.Chicago,Ill. U5, W14 .5.50
S.SanFrancisco B3 ....6.15
Sterling,Ill. N15 ....5.50
Torrance,Calif. C11 ....6.20
Weirton,W.Va. W6 ....5.50

Wide Flange
Bethlehem,Pa. B2 ....5.55
Clairton,Pa. U5 ....5.50
Fontana,Calif. K1 ....6.45
IndianaHarbor,Ind. I-2..5.50
Lackawanna,N.Y. B2 ..5.55
Munhall,Pa. U5 ....5.50
Phoenixville,Pa. P4 ....5.55
S.Chicago,Ill. U5, W14..5.50
Sterling,Ill. N15 ....5.50
Weirton,W.Va. W6 ....5.50

Alloy Std. Shapes
Aliquippa,Pa. J5 ....6.80
Clairton,Pa. U5 ....6.80
Gary,Ind. U5 ....6.80
Houston S5 ....6.90
Munhall,Pa. U5 ....6.80
S.Chicago,Ill. U5, W14..6.80

H.S., L.A., Std. Shapes
Aliquippa,Pa. J5 ....8.05
Bessemer,Ala. T2 ....8.05
Bethlehem,Pa. B2 ....8.10
Clairton,Pa. U5 ....8.05
Fairfield,Ala. T2 ....8.05
Fontana,Calif. K1 ....8.85
Gary,Ind. U5 ....8.05
Geneva,Utah C11 ....8.05
Houston S5 ....8.15
Ind.Harbor,Ind. I-2, Y1..8.05
Johnstown,Pa. B2 ....8.10
KansasCity,Mo. S5 ....8.15
Lackawanna,N.Y. B2 ..8.10
LosAngeles B3 ....8.75
Munhall,Pa. U5 ....8.05
Seattle B3 ....8.80
S.Chicago,Ill. U5, W14..8.05
S.SanFrancisco B3 ....8.70
Sterling,Ill. N15 ....7.75
Struthers,O. Y1 ....8.05

H.S., L.A., Wide Flange
Bethlehem,Pa. B2 ....8.10
Ind.Harbor,Ind. I-2 ....8.05
Lackawanna,N.Y. B2 ..8.10
Munhall,Pa. U5 ....8.05
S.Chicago,Ill. U5 ....8.05
Sterling,Ill. N15 ....7.75

PILING

BEARING PILES
Bethlehem,Pa. B2 ....5.55
Ind.Harbor,Ind. I-2 ....5.50
Lackawanna,N.Y. B2 ..5.55
Munhall,Pa. U5 ....5.50
S.Chicago,Ill. I-2, U5 ..5.50

STEEL SHEET PILING
Ind.Harbor,Ind. I-2 ....6.50
Lackawanna,N.Y. B2 ..6.50
Munhall,Pa. U5 ....6.50
S.Chicago,Ill. I-2, U5 ..6.50
Weirton,W.Va. W6 ....6.50

PLATES

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ..5.30
Aliquippa,Pa. J5 ....5.30
Ashland,Ky.(15) A10 ...5.30
Atlanta A11 ....5.50
Bessemer,Ala. T2 ....5.30
Clairton,Pa. U5 ....5.30
Claymont,Del. P4 ....5.30
Cleveland J5, R2 ....5.30
Coatesville,Pa. L7 ....5.30
Conshohocken,Pa. A3 ..5.30
Ecorse,Mich. G5 ....5.30
Fairfield,Ala. T2 ....5.30
Farrell,Pa. S3 ....5.30
Fontana,Calif.(30) K1 ..6.10
Gary,Ind. U5 ....5.30
Geneva,Utah C11 ....5.30
GraniteCity,Ill. G4 ....5.40
Harrisburg,Pa. P4 ....5.30
Houston S5 ....5.40
Ind.Harbor,Ind. I-2, Y1 .5.30
Johnstown,Pa. B2 ....5.30
Lackawanna,N.Y. B2 ..5.30
Mansfield,O. E6 ....5.30
Minnequa,Colo. C10 ....6.15
Munhall,Pa. U5 ....5.30
Newport,Ky. A2 ....5.30
Pittsburgh J5 ....5.30
Riverdale,Ill. A1 ....5.30
Seattle B3 ....6.20
Sharon,Pa. S3 ....5.30
S.Chicago,Ill. U5, W14 ..5.30
SparrowsPoint,Md. B2 ..5.30
Sterling,Ill. N15 ....5.30
Steubenville,O. W10 ....5.30
Warren,O. R2 ....5.30
Youngstown U5, Y1 ....5.30
Youngstown(27) R2 ....5.30

PLATES, Carbon Abras. Resist.
Claymont,Del. P4 ....7.05
Fontana,Calif. K1 ....7.85
Geneva,Utah C11 ....7.05
Houston S5 ....7.15
Johnstown,Pa. B2 ....7.05
SparrowsPoint,Md. B2 ..7.05

PLATES, Wrought Iron
Economy,Pa. B14 ....14.10

PLATES, H.S., L.A.
Aliquippa,Pa. J5 ....7.95
Ashland,Ky. A10 ....7.95
Bessemer,Ala. T2 ....7.95
Clairton,Pa. U5 ....7.95
Claymont,Del. P4 ....7.95
Cleveland J5, R2 ....7.95
Coatesville,Pa. L7 ....7.95
Conshohocken,Pa. A3 ..7.95
Economy,Pa. B14 ....7.95
Ecorse,Mich. G5 ....7.95
Fairfield,Ala. T2 ....7.95
Farrell,Pa. S3 ....7.95
Fontana,Calif.(30) K1 ..8.75
Gary,Ind. U5 ....7.95
Geneva,Utah C11 ....7.95
Houston S5 ....8.05
Ind.Harbor,Ind. I-2, Y1..7.95
Johnstown,Pa. B2 ....7.95
Munhall,Pa. U5 ....7.95
Pittsburgh J5 ....7.95
Seattle B3 ....8.85
Sharon,Pa. S3 ....7.95
S.Chicago,Ill. U5, W14..7.95
SparrowsPoint,Md. B2 ..7.95
Sterling,Ill. N15 ....7.625
Warren,O. R2 ....7.95
Youngstown U5, Y1 ....7.95

PLATES, Alloy
Aliquippa,Pa. J5 ....7.50
Claymont,Del. P4 ....7.50
Coatesville,Pa. L7 ....7.50
Economy,Pa. B14 ....7.50
Farrell,Pa. S3 ....7.50
Fontana,Calif. K1 ....8.30
Gary,Ind. U5 ....7.50
Houston S5 ....7.60
Ind.Harbor,Ind. Y1 ....7.50
Johnstown,Pa. B2 ....7.50
Lowellville,O. S3 ....7.50
Munhall,Pa. U5 ....7.50
Newport,Ky. A2 ....7.50
Pittsburgh J5 ....7.50
Seattle B3 ....8.40
Sharon,Pa. S3 ....7.50
S.Chicago,Ill. U5, W14..7.50
SparrowsPoint,Md. B2 ..7.50
Youngstown Y1 ....7.50

FLOOR PLATES
Cleveland J5 ....6.375
Conshohocken,Pa. A3 ..6.375
Harrisburg,Pa. P4 ....6.375
Ind.Harbor,Ind. I-2 ....6.375
Munhall,Pa. U5 ....6.375
Pittsburgh J5 ....6.375
S.Chicago,Ill. U5 ....6.375

PLATES, Ingot Iron
Ashland c.l.(15) A10 ...5.55
Ashland l.c.l.(15) A10 ..6.05
Cleveland c.l. R2 ....6.05
Warren,O. R2 ....6.05

BARS

BARS, Hot-Rolled Carbon
(Merchant Quality)
Ala.City,Ala.(9) R2 ...5.675
Aliquippa,Pa.(9) J5 ...5.675
Alton,Ill. L1 ....5.875
Atlanta(9) A11 ....5.875
Bessemer,Ala.(9) T2 ...5.675
Birmingham(9) C15 ...5.675
Buffalo(9) R2 ....5.675
Canton,O.(23) R2 ....6.15
Clairton,Pa.(9) U5 ....5.675
Cleveland(9) R2 ....5.675
Ecorse,Mich.(9) G5 ....5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala.(9) T2 ...5.675
Fairless,Pa.(9) U5 ....5.825
Fontana,Calif.(9) K1 ..6.375
Gary,Ind.(9) U5 ....5.675
Houston(9) S5 ....5.925
Ind.Harbor(9) I-2, Y1..5.675
Johnstown,Pa.(9) B2 ..5.675
Joliet,Ill. P2 ....5.675
KansasCity,Mo.(9) S5 ..5.925
Lackawanna(9) B2 ....5.675
LosAngeles(9) B3 ....6.375
Massillon,O.(23) R2 ....6.15
Midland,Pa.(23) C18 ..6.025
Milton,Pa. M18 ....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 ....6.375
Owensboro,Ky.(9) G8 ..6.025
Pittsburg,Calif.(9) C11..6.375
Pittsburgh(9) J5 ....5.675
Portland,Oreg. O4 ....6.425
Riverdale,Ill.(9) A1 ....5.675
Seattle(9) A24,B3,N15 .6.425
S.Ch'c'go(9)R2,U5,W14 5.675
S.Duquesne,Pa.(9) U5..5.675
S.SanFran.,Calif.(9)B3 6.425
Sterling,Ill.(1)(9) N15..5.675
Sterling,Ill.(9) N15 ....5.775
Struthers,O.(9) Y1 ....5.675
Tonawanda,N.Y. B12 ..5.675
Torrance,Calif.(9) C11 .6.375
Warren,O. C17 ....6.025
Youngstown(9) R2,U5..5.675

BARS, Hot-Rolled Alloy
Aliquippa,Pa. J5 ....6.725
Bethlehem,Pa. B2 ....6.725
Bridgeport,Conn. C32 ...6.80
Buffalo R2 ....6.725
Canton,O. R2 T7 ....6.725
Clairton,Pa. U5 ....6.725
Detroit S41 ....6.725
Economy,Pa. B14 ....6.725
Ecorse,Mich. G5 ....6.725
Farrell,Pa. S3 ....6.725
Fontana,Calif. K1 ....7.775
Gary,Ind. U5 ....6.725
Houston S5 ....6.975
Ind.Harbor,Ind. I-2, Y1 6.725
Johnstown,Pa. B2 ....6.725
KansasCity,Mo. S5 ....6.975
Lackawanna,N.Y. B2 ..6.725
LosAngeles B3 ....7.775
Lowellville,O. S3 ....6.725
Massillon,O. R2 ....6.725
Midland,Pa. C18 ....6.725
Owensboro,Ky. G8 ....6.725
Pittsburgh J5 ....6.725
Seattle(6) B3 ....7.825
Sharon,Pa. S3 ....6.725
S.Chicago R2, U5, W14..6.725
S.Duquesne,Pa. U5 ....6.725
Struthers,O. Y1 ....6.725
Warren,O. C17 ....6.725
Youngstown U5 ....6.725

BARS & SMALL SHAPES, H.R.
High-Strength, Low-Alloy
Aliquippa,Pa. J5 ....8.30
Bessemer,Ala. T2 ....8.30
Bethlehem,Pa. B2 ....8.30
Clairton,Pa. U5 ....8.30
Cleveland R2 ....8.30
Ecorse,Mich. G5 ....8.30
Fairfield,Ala. T2 ....8.30
Fontana,Calif. K1 ....9.00
Gary,Ind. U5 ....8.30
Houston S5 ....8.55
Ind.Harbor,Ind. Y1 ....8.30
Johnstown,Pa. B2 ....8.30
KansasCity,Mo. S5 ....8.55
Lackawanna,N.Y. B2 ..8.30
LosAngeles B3 ....9.00
Pittsburgh J5 ....8.30
Seattle B3 ....9.05
S.Chicago,Ill. R2, W14..8.30
S.Duquesne,Pa. U5 ....8.30
S.SanFrancisco B3 ....9.05
Sterling,Ill. N15 ....7.925
Struthers,O. Y1 ....8.30
Youngstown U5 ....8.30

BAR SIZE ANGLES; H.R. Carbon
Bethlehem,Pa.(9) B2 ..5.825
Houston(9) S5 ....5.925
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
Sterling,Ill. N15 ....5.775
Sterling,Ill.(1) N15 ....5.675
Tonawanda,N.Y. B12 ..5.675

BAR SIZE ANGLES; S. SHAPES
Wrought Iron
Aliquippa,Pa. J5 ....5.675
Atlanta A11 ....5.875
Joliet,Ill. P22 ....5.675
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 ....6.375
Pittsburgh J5 ....5.675
Portland,Oreg. O4 ....6.425
SanFrancisco S7 ....6.52
Seattle B3 ....6.425

BAR SIZE ANGLES; S. SHAPES
Wrought Iron
Economy,Pa. B14 ....16.45

BAR SHAPES, Hot-Rolled Alloy
Aliquippa,Pa. J5 ....6.80
Clairton,Pa. U5 ....6.80
Gary,Ind. U5 ....6.80
Houston S5 ....7.05
KansasCity,Mo. S5 ....7.05
Pittsburgh J5 ....6.80
Youngstown U5 ....6.80

BARS, C.F. Loaded
(Including loaded extra)
Carbon
LosAngeles P2, S30 ..11.75*

Alloy
Ambridge,Pa. W18 ...10.175
BeaverFalls,Pa. M12 ..10.175
Camden,N.J. P13 ....10.35
Chicago W18 ....10.175
Elyria,O. W8 ....10.175
Monaca,Pa. S17 ....10.175
Newark,N.J. W18 ....10.35
SpringCity,Pa. K3 ....10.35

*Grade A; add 0.5c for Grade B.

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 ....7.65
BeaverFalls,Pa. M12,R2 .7.65
Birmingham C15 ....8.25
Buffalo B5 ....7.70
Camden,N.J. P13 ....8.10
Carnegie,Pa. C12 ....7.65
Chicago W18 ....7.65
Cleveland A7, C20 ....7.65
Detroit B5, P17 ....7.85
Detroit S41 ....7.65
Donora,Pa. A7 ....7.65
Elyria,O. W8 ....7.65
FranklinPark,Ill. N5 ...7.65
Gary,Ind. R2 ....7.65
GreenBay,Wis. F7 ....7.65
Hammond,Ind. J5, L2 ..7.65
Hartford,Conn. R2 ....8.15
Harvey,Ill. B5 ....7.65
LosAngeles(49) S30 ....9.10
LosAngeles(49) P2, R2..9.10
Mansfield,Mass. B5 ....8.20
Massillon,O. R2, R8 ....7.65
Midland,Pa. C18 ....7.65
Monaca,Pa. S17 ....7.65
Newark,N.J. W18 ....8.10
NewCastle,Pa.(17) B4 ..7.65
Pittsburgh J5 ....7.65
Plymouth,Mich. P5 ....7.90
Putnam,Conn. W18 ....8.20
Readville,Mass. C14 ....8.20
Seattle(49) S30 ....9.10
S.Chicago,Ill. W14 ....7.65
SpringCity,Pa. K3 ....8.10
Struthers,O. Y1 ....7.65
Warren,O. C17 ....7.65
Waukegan,Ill. A7 ....7.65
Willimantic,Conn. J5 ...8.15
Youngstown F3, Y1 ....7.65

BARS, Cold-Finished Carbon
(Turned and Ground)
Cumberland,Md.(5) C19..6.55

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 ....9.025
BeaverFalls,Pa. M12,R2 9.025
Bethlehem,Pa. B2 ....9.025
Bridgeport,Conn. C32 ..9.175
Buffalo B5 ....9.025
Camden,N.J. P13 ....9.20
Canton,O. T7 ....9.025
Carnegie,Pa. C12 ....9.025
Chicago W18 ....9.025
Cleveland A7, C20 ....9.025
Detroit B5, P17 ....9.225
Detroit S41 ....9.025
Donora,Pa. A7 ....9.025
Elyria,O. W8 ....9.025
FranklinPark,Ill. N5 ..9.025
Gary,Ind. R2 ....9.025
GreenBay,Wis. F7 ....9.025
Hammond,Ind. J5, L2..9.025
Hartford,Conn. R2 ....9.325
Harvey,Ill. R5 ....9.025
Lackawanna,N.Y. B3 ..9.025
LosAngeles P2, S30 ...11.00
Mansfield,Mass. B5 ...9.325
Massillon,O. R2, R8 ..9.025
Midland,Pa. C18 ....9.025
Monaca,Pa. S17 ....9.025
Newark,N.J. W18 ....9.20
Plymouth,Mich. P5 ....9.225
S.Chicago,Ill. W14 ....9.025
SpringCity,Pa. K3 ....9.20

Struthers,O. Y1 .....9.025
Warren,O. C17 .....9.025
Waukegan,Ill. A7 ....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

AlabamaCity,Ala. R2 ..5.675
Atlanta A11 .....5.25
Birmingham C15 .....5.25
Buffalo R2 .....5.675
Cleveland R2 .....5.675
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala. T2 .....5.675
Fairless,Pa. U5 .....5.825
Fontana,Calif. K1 ....6.375
Ft.Worth,Tex.(26) T4 ..5.50
Gary,Ind. U5 .....5.675
Houston S5 .....5.675
Ind.Harbor,Ind. I-2,Y1.5.675
Johnstown,Pa. B2 ....5.675
Joliet,Ill. P22 .....5.675
KansasCity,Mo. S5 ....5.675
Kokomo,Ind. C16 .....5.775
Lackawanna,N.Y. B2..5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.875
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburg,Calif. C11 ...6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ....6.425
SandSprings,Okla. S5 ..5.675
Seattle A24, B3, N14 ..6.425
S.Chicago,Ill. R2, W14.5.675
S.Duquesne,Pa. U5 ....5.675
S.SanFrancisco B3 ...6.425
SparrowsPoint,Md. B2..5.675
Steelton,Pa. B2 .....5.675
Sterling,Ill.(1) N15 ...5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ...6.10
Torrance,Calif. C11 ..6.375
Youngstown R2, U5 ..5.675

BARS, Reinforcing, Billet (Fabricated: to Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Houston S5 .....7.35
Johnstown,Pa. B2 ....7.33
KansasCity,Mo. S5 ....7.35
Lackawanna,N.Y. B2 ..7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 .....7.35
SandSprings,Okla. S5 ...7.35
Seattle A24, B3, N14 ..7.95
SparrowsPoint,Md. B2 ..7.33
St.Paul U8 .....8.17
Williamsport,Pa. S19 ...7.25

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 15.10
Economy,Pa.(D.R.)B14 19.30
Econ.(DirectRolled)B14 13.55
Economy(Staybolt)B14 19.80
McK.Rks.(S.R.) L5 ...14.50
McK.Rks.(D.R.)L5 ...19.80
McK.Rks.(Staybolt)L5. 20.95

BARS, Rail Steel

ChicagoHts.(3) C2, I-2.5.575
ChicagoHts.(4)(44) I-2.5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa.(3) F5 ....5.575
Franklin,Pa.(4) F5 ....5.675
JerseyShore,Pa.(3) J8 .5.55
Marion,O.(3) P11 ....5.575
Tonawanda(3) B12 ....5.575
Tonawanda(4) B12 ....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ...5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ...5.15
Detroit(8) M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ..5.20
Ind.Harbor,Ind. I-2, Y1.5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ..5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ....5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 ....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14..5.10
SparrowsPoint,Md. B2 ..5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3 .....6.275

SHEETS, H.R. Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 ....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 .....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ...7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14.7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(36) B2..7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ...7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ...5.35
Cleveland R2 .....5.875
Warren,O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown,O. A10 ....6.775
Warren,O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 ..6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ..7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2..6.275
Steubenville,O. W10 ...6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Yorkville,O. W10 .....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 ....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ..9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert

	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.225	....
Ashland,Ky. A10	7.225	7.475
Canton,O. R2	7.225	....
Fairfield,Ala. T2	7.225	7.475
Gary,Ind. U5	7.225	7.475
GraniteCity,Ill.G4	7.325	....
Ind.Harbor I-2	7.225	7.475
Irvin,Pa. U5	7.225	7.475
Kokomo,Ind. C16	7.325	....
MartinsFry. W10	7.225	7.475
Pitts.,Calif. C11	7.975	....
Pittsburgh J5	7.225	....
SparrowsPt. B2	7.225	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ...7.475

SHEETS, Enameling

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Long Terne, Steel

Follansbee,W.Va. W10 .7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 ....7.225
Warren,O. R2 .....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 9.625
Butler,Pa. A10 (type 2) 9.625
Irvin,Pa. U5 (type 1) ..9.525

SHEETS, Well Casing

Fontana,Calif. K1 ....7.325

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.025

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.275
Irvin,Pa. U5 .....7.275

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ....7.125

SHEETS, Electrogalvanized

Cleveland(28) R2 .....7.65
Niles,O.(28) R2 .....7.65
Weirton,W.Va. W6 ....7.50

SHEETS, Galvanized Steel Hot-Dipped

AlabamaCity,Ala. R2..6.875‡
Ashland,Ky. A10 ....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 ....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ...6.975*
Ind.Harbor,Ind. I-2 ..6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 ....6.975‡
MartinsFerry,O. W10..6.875*
Middletown,O. A10 ..6.875†
Pittsburg,Calif. C11 ..7.625*
Pittsburgh J5 .....6.875†
SparrowsPt.,Md. B2 ..6.875†
Warren,O. R2 .....6.875†
Weirton,W.Va. W6 ...6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A24 Alaska Steel Mills Inc.
A25 Algoma Steel Corp. Ltd.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N.Eng.
D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.
M23 Mill Strip Products Co. of Pennsylvania

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N20 Neville Ferro Alloy Co.

O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div.,EatonMfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Div., Bliss & Laughlin Inc.
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America
S45 Somers Brass Co.
S46 Steel Co. of Canada

T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Products & Chemical Corp.
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope Corp.
U4 Universal-Cyclops Steel
U5 U. S. Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.

V2 Vanadium-Alloy Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.
Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2 ...5.10
Allenport,Pa. P7 .....5.10
Alton,Ill. L1 .....5.30
Ashland,Ky.(8) A10 ....5.10
Atlanta A11 .....5.10
Bessemer,Ala. T2 .....5.10
Birmingham C15 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Ind.Harbor,Ind. I-2, Y1..5.10
Johnstown,Pa.(25) B2...5.10
Lackaw'na,N.Y.(25) B2.5.10
LosAngeles(25) S3 .....5.85
LosAngeles C1 .....8.60
Minnequa,Colo. C10 ....6.20
Riverdale,Ill. A1 .....5.10
SanFrancisco S7 .....6.60
Seattle(25) B3 .....6.10
Seattle N14 .....6.60
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. W14 ....5.10
S.SanFrancisco(25) B3 ..5.85
SparrowsPoint,Md. B2 ..5.10
Torrance,Calif. C11 ....5.85
Warren,O. R2 .....5.10
Weirton,W.Va. W6 .....5.10
Youngstown U5 .....5.10

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18 .....8.40
Farrell,Pa. S3 .....8.40
Gary,Ind. U5 .....8.40
Houston S5 .....8.65
Ind.Harbor,Ind. Y1 .....8.40
KansasCity,Mo. S5 .....8.65
LosAngeles B3 .....9.60
Lowellville,O. S3 .....8.40
Newport,Ky. A2 .....8.40
Sharon,Pa. A2, S3 .....8.40
S.Chicago,Ill. W14 .....8.40
Youngstown U5, Y1 ...8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland,Ky. A10 .....7.575
Bessemer,Ala. T2 .....7.575
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.575
Fairfield,Ala. T2 .....7.575
Farrell,Pa. S3 .....7.575
Gary,Ind. U5 .....7.575
Ind.Harbor,Ind. I-2,Y1 7.575
Lackawanna,N.Y. B2..7.575
LosAngeles(25) B3 ....8.325
Seattle(25) B3 .....8.575
Sharon,Pa. S3 .....7.575
S.Chicago,Ill. W14 ....7.575
S.SanFrancisco(25) B3..8.325
SparrowsPoint,Md. B2 .7.575
Warren,O. R2 .....7.575
Weirton,W.Va. W6 ....7.575
Youngstown U5, Y1 ...7.575

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ...5.35
Warren,O. R2 .....5.875

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6 .....7.425
Baltimore T6 .....7.425
Boston T6 .....7.975
Buffalo S40 .....7.425
Cleveland A7, J5 .....7.425
Dearborn,Mich. S3 .....7.425
Detroit D2, M1, P20 ..7.425
Dover,O. G6 .....7.425
Evanston,Ill. M22 .....7.525
Farrell,Pa. S3 .....7.425
Follansbee,W.Va. W10 .7.425
Fontana,Calif. K1 .....9.20
FranklinPark,Ill. T6 ..7.525
Ind.Harbor,Ind. Y1 ....7.425
Indianapolis S41 .....7.575
LosAngeles C1, S41 ....9.30
McKeesport,Pa. E10 ..7.525
NewBedford,Mass. R10..7.875
NewBritain,Conn. S15 ..7.875
NewCastle,Pa. B4, M23 7.425
NewHaven,Conn. D2 ..7.875
NewKensington,Pa. A6.7.425
Pawtucket,R.I. R3, N8..7.975
Philadelphia P24 .....7.875
Pittsburgh J5 .....7.425
Riverdale,Ill. A1 .....7.525
Rome,N.Y.(32) R6 ....7.425
Sharon,Pa. S3 .....7.425
Trenton,N.J.(31) R5 ...8.875
Warren,O. R2, T5 ....7.425
Worcester,Mass. A7 ...7.975

STRIP, Cold-Rolled Alloy

Boston T6 .....15.90
Cleveland A7 .....15.55
Carnegie,Pa. S18 .....15.55
Dover,O. G6 .....15.55
Farrell,Pa. S3 .....15.55
FranklinPark,Ill. T6 ..15.55
Harrison,N.J. S18 ....15.55
Indianapolis S41 .....15.70
LosAngeles S41 .....17.75
Lowellville,O. S3 .....15.55
Pawtucket,R.I. N8 ....15.90
Riverdale,Ill. A1 .....15.55
Sharon,Pa. S3 .....15.55
Worcester,Mass. A7 ...15.85
Youngstown S41 .....15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7 .....10.80
Dearborn,Mich. S3 ....10.80
Dover,O. G6 .....10.80
Farrell,Pa. S3 .....10.80
Ind.Harbor,Ind. Y1 ....10.80
Sharon,Pa. S3 .....10.80
Warren,O. R2 .....10.80
Weirton,W.Va. W6 ....10.80
Youngstown Y1 .....10.80

STRIP, Galvanized (Continuous)

Farrell,Pa. S3 .....7.50
Sharon,Pa. S3 .....7.50

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Anderson,Ind. G6	9.10	....	....	....	....
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	9.05	10.40	12.60	15.60	....
Farrell,Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria,O. S1	10.05	10.40	12.60	15.60	....
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain,Conn S15	9.40	10.70	12.90	15.90	18.85
NewCastle,Pa. B4, M23	8.95	10.40	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	8.95	10.40	12.60	15.60	....
NewYork W3	....	10.70	12.90	16.10	19.30
Pawtucket,R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome,N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	....	10.70	12.90	15.90	18.85
Warren,O. T5	8.95	10.40	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)			Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	....	....	18.85	22.95	27.80
Buffalo W12	....	....	18.85	....	....
Fostoria,O. S1	....	....	19.05	22.15	....
FranklinPark,Ill T6	....	....	19.20	23.30	28.15
Harrison,N.J. C18	....	....	18.85	22.95	27.80
NewYork W3	....	....	18.85	22.95	27.80
Palmer,Mass. W12	....	....	18.85	....	....
Trenton,N.J. R5	....	....	18.85	22.95	27.80
Worcester,Mass. A7, T6	....	....	18.85	22.95	27.80
Youngstown S41	....	....	19.20	23.30	28.15

STRIP, C.R., Electrogalvanized

Cleveland A7 .....7.425*
Dover,O. G6 .....7.425*
Evanston,Ill. M22 ....7.525*
McKeesport,Pa. E10 ...7.50*
NewCastle,Pa. M23 ..7.425*
Riverdale,Ill. A1 .....7.525*
Warren,O. B9, S3, T5.7.425*
Worcester,Mass. A7 ...7.975
Youngstown S41, Y1 .7.425*

*Plus galvanizing extras.

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2 .....8.175

TIGHT COOPERAGE HOOP

Atlanta A11 .....5.825
Farrell,Pa. S3 .....5.525
Riverdale,Ill. A1 .....5.675
Sharon,Pa. S3 .....5.525
Youngstown U5 .....5.525

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$9.10	$9.35	$9.75
Fairfield,Ala. T2	9.20	9.45	9.85
Fairless,Pa. U5	9.20	9.45	9.85
Fontana,Calif. K1	9.75	10.00	10.40
Gary,Ind. U5	9.10	9.35	9.75
GraniteCity,Ill. G4	9.20	9.45	9.85
IndianaHarbor,Ind. I-2, Y1	9.10	9.35	9.75
Irvin,Pa. U5	9.10	9.35	9.75
Niles,O. R2	9.10	9.35	9.75
Pittsburg,Calif. C11	9.75	10.00	10.40
SparrowsPoint,Md. B2	9.10	9.35	9.75
Weirton,W.Va. W6	9.10	9.35	9.75
Yorkville,O. W10	9.10	9.35	9.75

ELECTROLYTIC TIN-COATED SHEET (Dollars per 100 lb)

Aliquippa,Pa. J5 (21-27 Ga.)	7.90	8.10	....
IndianaHarbor,Ind. Y1 (20-27 Ga.)	7.90	....	....
Niles,O. R2 (20-27 Ga.)	7.90	8.10	8.30

ELECTROLYTIC THIN TIN PLATE (¼ lb coating in coils)

	Base Box			
	45 lb	50 lb	55 lb	60 lb
Fairfield,Ala. T2	$6.20	$6.35	$6.50	$6.65
Fairless,Pa. U5	6.20	6.35	6.50	6.65
Gary,Ind. U5	6.10	6.25	6.40	6.55
Irvin,Pa. U5	6.10	6.25	6.40	6.55
SparrowsPoint,Md. B2	6.10	6.25	6.40	6.55

TIN PLATE,Hot Dipped 1.25 Common Coke	1.50 lb	lb
Aliquippa,Pa. J5	$10.40	$10.65
Fairfield,Ala. T2	10.50	10.75
Fontana,Calif.K1	11.05	11.30
Gary,Ind. U5	10.40	10.65
Irvin,Pa. U5	10.40	10.65
Pitts.,Calif. C11	11.05	11.30
Sp.Pt.,Md. B2	10.40	10.65
Weirton,W.Va.W6	10.40	10.65
Yorkville,O. W10	10.40	10.65

BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$8.20
Fairfield,Ala. T2	8.30
Fairless,Pa. U5	8.30
Fontana,Calif. K1	8.85
Gary,Ind. U5	8.20
GraniteCity,Ill. G4	8.30
Ind.Harbor,Ind. I-2, Y1	8.20
Irvin,Pa. U5	8.20
Niles,O. R2	8.20
Pittsburg,Calif. C11	8.85
SparrowsPoint,Md. B2	8.20
Weirton,W.Va. W6	8.20
Yorkville,O. W10	8.20

HOLLOWARE ENAMELING (Black Plate) (29 Gage)

Aliquippa,Pa. J5	7.85
Gary,Ind. U5	7.85
GraniteCity,Ill. G4	7.95
Ind.Harbor,Ind. Y1	7.85
Irvin,Pa. U5	7.85
Yorkville,O. W10	7.85

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge,Pa. A4	....	....	12.40	13.35	14.65
GraniteCity,Ill. G4	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor,Ind. I-2	9.875*	11.20*	11.90*	13.05*	....
Mansfield,O. E6	9.875*	11.70	12.40	13.55	14.65
Newport,Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles,O. M21	9.875*	11.70	12.40	13.55	....
Vandergrift,Pa. U5	9.875*	11.70	12.40	13.55	14.65
Warren,O. R2	9.875*	11.70	12.40	13.55	14.65
Zanesville,O. A10	....	11.70†	12.40	13.55	14.65

	Stator
Mansfield,O. E6	8.10
Vandergrift,Pa. U5	8.10
Warren,O. R2 (Locore)	8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.70	16.30	16.80	17.85
Zanesville,O. A10	15.70	16.30	16.80	17.85
Vandergrift,Pa. U5	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	18.10	19.70	20.20	20.70	15.70††
Butler,Pa. A10	....	....	....	19.70	20.20	20.70 ....
Vandergrift,Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren,O. R2	....	....	....	....	....	15.70‡

*Semiprocessed. †Fully processed only. ‡Coil, annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2 ..8.00
Aliquippa,Pa. J5 .....8.00
Alton,Ill. L1 .....8.20
Atlanta A1 .....8.00
Bartonville,Ill. K4 .....8.10
Buffalo W12 .....8.00
Chicago W13 .....8.00
Cleveland A7, C20 ....8.00
Crawfordsville,Ind. M8..8.10
Donora,Pa. A7 .....8.00
Duluth A7 .....8.00
Fairfield,Ala. T2 .....8.00
Fostoria,O.(24) S1 .....8.10
Houston S5 .....8.25
Jacksonville,Fla. M8 ...8.35
Johnstown,Pa. B2 .....8.00
Joliet,Ill. A7 .....8.00
KansasCity,Mo. S5 ....8.25
Kokomo,Ind. C16 .....8.10
LosAngeles B3 .....8.95
Minnequa,Colo. C10 ....8.25
Monessen,Pa. P7, P16...8.00
Palmer,Mass. W12 .....8.30
Pittsburg,Calif. C11 ....8.95
Portsmouth,O. P12 .....8.00
Rankin,Pa. A7 .....8.00
S.Chicago,Ill. R2 .....8.00
S.SanFrancisco C10 ....8.95
SparrowsPoint,Md. B2 ..8.10
Sterling,Ill.(1) N15 ....8.00
Sterling,Ill. N15 .....8.10
Struthers,O. Y1 .....8.00
Waukegan,Ill. A7 .....8.00
Worcester,Mass. A7 ....8.30

WIRE, Cold Heading Carbon

Elyria,O. W8 .....8.00

WIRE, Gal'd., for ACSR

Bartonville,Ill. K4 ....12.65
Buffalo W12 .....13.40
Cleveland A7 .....12.65
Donora,Pa. A7 .....12.65
Duluth A7 .....12.65
Johnstown,Pa. B2 .....13.40
KansasCity,Mo. U3 ....12.90
Minnequa,Colo. C10 ...12.775
Monessen,Pa. P7, P16..12.65
Muncie,Ind. I-7 .....13.60
NewHaven,Conn. A7 ...12.95
Palmer,Mass. W12 .....13.70
Pittsburg,Calif. C11 ....13.45
Portsmouth,O. P12 .....12.65
Roebling,N.J. R5 .....12.95
SparrowsPt.,Md. B2 ....13.50
Struthers,O. Y1 .....13.40
Trenton,N.J. A7 .....12.95
Waukegan,Ill. A7 .....12.65
Worcester,Mass. A7 ...12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
Kokomo,Ind. C16 .....9.85
LosAngeles B3 .....10.70
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16...9.75
NewHaven,Conn. A7 ...10.05
Palmer,Mass. W12 .....10.05
Pittsburg,Calif. C11 ....10.70
Portsmouth,O. P12 .....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ....10.70
SparrowsPt.,Md. B2 ....9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Worcester,Mass. A7 ...10.05

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Bartonville,Ill. K4 .....9.85
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Fostoria,O. S1 .....9.80
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
LosAngeles B3 .....10.70
Millbury,Mass.(12) N6 .10.05
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16 ..9.75
Muncie,Ind. I-7 .....9.95
Palmer,Mass. W12 .....10.05
Pittsburg,Calif. C11 ....10.70
Portsmouth,O. P12 .....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ....10.70
SparrowsPt.,Md. B2 ....9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Wor'ster,Mass.A7,J4,T6 10.05

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1 .....16.50
Bartonville,Ill. K4 ....16.40
Chicago W13 .....16.30
Cleveland A7 .....16.30
Crawfordsville,Ind. M8.16.40
Fostoria,O. S1 .....16.30
Houston S5 .....16.55
Jacksonville,Fla. M8 ..16.65
Johnstown,Pa. B2 .....16.30
KansasCity,Mo. S5 ....16.55
Kokomo,Ind. C16 .....16.30
Minnequa,Colo. C16 ....16.55
Monessen,Pa. P16 .....16.30
Muncie,Ind. I-7 .....16.50
Palmer,Mass. W12 .....16.60
S.SanFrancisco C10 ....17.15
Waukegan,Ill. A7 .....16.30
Worcester,Mass. A7, J6.16.60

ROPE WIRE (A)

Bartonville,Ill. K4 .....13.45
Buffalo W12 .....13.45
Fostoria,O. S1 .....13.45
Johnstown,Pa. B2 .....13.45
Monessen,Pa. P7 .....13.45
Muncie,Ind. I-7 .....13.65
Palmer,Mass. W12 .....13.75
Portsmouth,O. P12 .....13.45
Roebling,N.J. R5 .....13.75
St.Louis L8 .....13.45
SparrowsPt.,Md. B2 ...13.55
Struthers,O. Y1 .....13.45
Worcester,Mass. J4 ....13.75

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE, Tire Bead

Bartonville,Ill. K4	....17.15
Monessen,Pa. P16	....17.15
Roebling,N.J. R5	....17.65

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	....12.35
Baltimore T6	....12.65
Boston T6	....12.65
Buffalo W12	....12.35
Chicago W13	....12.45
Cleveland A7	....12.35
Crawfordsville,Ind. M8	.12.35
Dover,O. G6	....12.35
Evanston,Ill. M22	....12.45
Farrell,Pa. S3	....12.35
Fostoria,O. S1	....12.35
FranklinPark,Ill. T6	..12.45
Kokomo,Ind. C16	....12.35
Massillon,O. R8	....12.35
Milwaukee C23	....12.55
Monessen,Pa. P7, P16	..12.35
NewCastle,Pa. M23	...12.35
Palmer,Mass. W12	...12.65
Pawtucket,R.I. N8	....12.65
Philadelphia P24	....12.65
Riverdale,Ill. A1	....12.45
Rome,N.Y. R6	....12.35
Sharon,Pa. S3	....12.35
Trenton,N.J. R5	....12.65
Warren,O. B9	....12.35
Worcester,Mass. A7,T6	.12.65

NAILS, Stock Sizes — Col.

AlabamaCity,Ala. R2	...173
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	..175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	...175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex. D7	...$10.30

NAILS, CUT (100 lb kegs)

Wheeling,W.Va. W10	..$10.10

POLISHED STAPLES — Col.

AlabamaCity,Ala. R2	...175
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	..177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	175
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
Rankin,Pa. A7	173
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	177
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

TIE WIRE, Automatic Baler (14½ Ga.) (per 97 lb Net Box) Coil No. 3150

AlabamaCity,Ala. R2	..$8.78
Atlanta A11	....10.36
Bartonville,Ill. K4	....8.88
Buffalo W12	....10.26
Chicago W13	....9.24
Crawfordsville,Ind. M8	..8.88
Donora,Pa. A7	....8.78
Duluth A7	....8.78
Fairfield,Ala. T2	....8.78
Houston S5	....10.51
Jacksonville,Fla. M8	...8.88
Johnstown,Pa. B2	....8.78
Joliet,Ill. A7	....8.78
KansasCity,Mo. S5	....10.51
Kokomo,Ind. C16	....8.88
LosAngeles B3	....9.44
Minnequa,Colo. C10	....9.02
Pittsburg,Calif. C11	....9.44
S.Chicago,Ill. R2	....8.78
S.SanFrancisco C10	....9.94
SparrowsPt.,Md. B2	....8.88
Sterling,Ill.(37) N15	...8.88

Coil No. 6500 Stand.

AlabamaCity,Ala. R2	..$9.06
Atlanta A11	....10.70
Bartonville,Ill. K4	....9.16
Buffalo W12	....10.60
Chicago W13	....9.54
Crawfordsville,Ind. M8	..9.16
Donora,Pa. A7	....9.06
Duluth A7	....9.06
Fairfield,Ala. T2	....9.06
Houston S5	....10.85
Jacksonville,Fla. M8	..9.16
Jonnstown,Pa. B2	....9.06
Joliet,Ill. A7	....9.06
KansasCity,Mo. S5	....10.85
Kokomo,Ind. C16	....9.16
LosAngeles B3	....9.75
Minnequa,Colo. C10	....9.30
Pittsburg,Calif. C11	....9.75
S.Chicago,Ill. R2	....9.06
S.SanFrancisco C10	...10.26
SparrowsPt.,Md. B2	....9.16
Sterling,Ill.(37) N15	....9.16

Coil No. 6500 Interim

AlabamaCity,Ala. R2	..$9.11
Atlanta A11	....10.75
Bartonville,Ill. K4	....9.21
Buffalo W12	....10.65
Chicago W13	....9.59
Crawfordsville,Ind. M8	..9.21
Donora,Pa. A7	....9.11
Duluth A7	....9.11
Fairfield,Ala. T2	....9.11
Houston S5	....10.90
Jacksonville,Fla. M8	....9.21
Johnstown,Pa. B2	....9.11
Joliet,Ill. A7	....9.11
KansasCity,Mo. S5	....10.96
Kokomo,Ind. C16	....9.21
LosAngeles B3	....9.80
Minnequa,Colo. C10	....9.35
Pittsburg,Calif. C11	....9.80
S.Chicago,Ill. R2	....9.11
S.SanFrancisco C10	...10.31
SparrowsPt.,Md. B2	....9.21
Sterling,Ill.(37) N15	....9.21

BALE TIES, Single Loop — Col.

AlabamaCity,Ala. R2	...212
Atlanta A11	212
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	..214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

FENCE POSTS — Col.

Birmingham C15	177
ChicagoHts.,Ill. C2, I-2	..177
Duluth A7	177
Franklin,Pa., F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	...177

WIRE, Barbed — Col.

AlabamaCity,Ala. R2	.193**
Aliquippa,Pa. J5	....190§
Atlanta A11	....197*
Bartonville,Ill. K4	199
Crawfordsville,Ind. M8	..198
Donora,Pa. A7	....193†
Duluth A7	....193†
Fairfield,Ala. T2	....193†
Houston S5	....198**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	....196§
Joliet,Ill. A7	....193†
KansasCity,Mo. S5	....198**
Kokomo,Ind. C16	....195†
Minnequa,Colo. C10	....198**
Monessen,Pa. P7	....196§
Pittsburg,Calif. C11	....213†
Rankin,Pa. A7	....193†
S.Chicago,Ill. R2	....193**
SparrowsPoint,Md. B2	..198§
Sterling,Ill.(7) N15	198

WIRE (16 gage)	An'ld Stone	Galv. Stone
Ala.City,Ala. R2	17.85	19.40**
Ali'ppa,Pa. J5	..17.85	19.65
Bartonville K4	..17.95	19.80
Chicago W13	....17.85	....
Cleveland A7	....17.85	....
Craw'sville M8	17.95	19.80‡‡
Fostoria,O. S1	..18.35	19.90†
Houston S5	....18.10	19.65**
Jacksonville M8	18.95	19.80‡‡
Johnstown B2	..17.85	19.65§
Kan.City,Mo. S5	.18.10	....
Kokomo C16	....17.95	19.50†
Minnequa C10	..18.10	19.65**
P'lm'r,Mass. W12	18.15	19.70†
Pitts.,Calif. C11	18.20	19.75†
S.SanFran. C10	18.20	19.75**
St'ling(37) N15	..17.95	19.80
SparrowsPt. B2	..17.95	19.75§
Waukegan A7	..17.55	19.40†
Worcester A7	...18.15	....

WOVEN FENCE, 9-15 Ga. Col.

Ala.City,Ala. R2	.....187**
Aliq'ppa,Pa.9-11½ga.J5	190§
Atlanta A11	.....191*
Bartonville,Ill. K4	193
Crawfordsville,Ind. M8	..192
Donora,Pa. A7	.....187†
Duluth A7	.....187†
Fairfield,Ala. T2	.....187†
Houston S5	.....192**
Jacksonville,Fla. M8	192
Johnstown,Pa.(42) B2	..190§
Joliet,Ill. A7	.....187†
KansasCity,Mo. S5	....192**
Kokomo,Ind. C16	.....189†
Minnequa,Colo. C10	..192**
Pittsburg,Calif. C11	....210†
Rankin,Pa. A1	.....187†
S.Chicago,Ill. R2	....187**
Sterling,Ill.(7) N15	192

WIRE, Merchant (6 to 8 gage)	Quality An'ld	Galv.
Ala.City,Ala. R2	9.00	9.55**
Aliquippa J5	....8.65	9.325§
Atlanta(48) A11	..9.00	9.75*
Bartonville(48)K4	9.85	19.90
Buffalo W12	....9.00	9.55†
Chicago W13	....9.00	9.55**
Cleveland A7	....9.00	....
Crawfordsville M8	9.10	9.80‡†
Donora,Pa. A7	..9.00	9.55†
Duluth A7	.....9.00	9.55†
Fairfield T2	.....9.00	9.55†
Houston(48) S5	..9.25	9.80**
Jack'ville,Fla. M8	9.10	9.80‡‡
Johnstown(48) B2	9.00	9.675§
Joliet,Ill. A7	....9.00	9.55†
KansasCity(48)S5	9.25	9.80**
Kokomo(48) S16	..9.10	9.65†
LosAngeles B3	..9.95	10.625§
Minnequa C10	..9.25	9.80**
Monessen(48) P7	8.65	9.35§
Palmer,Mass. W12	9.30	9.85†
Pitts.,Calif. C11	..9.95	10.50†
Rankin,Pa. A7	...9.00	9.55†
S.Chicago R2	....9.00	9.55**
S.SanFran. C10	.9.95	10.50**
Spar'wsPt.(48)B2	9.10	9.775§
St'ling(37)(48)N15	9.10	9.80
Struthers,O. Y1	..9.00	9.65‡
Worcester,Mass.A7	9.30	9.85†

Based on zinc prices of: *13.50c. †5c. §10c. Less than 10c. ††10.50c. ‡‡11.00c. **Subject to zinc equalization extras.

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great. Structural ½ in., larger 12.85 7/16 in. and smaller by 6 in. and shorter: 15% off list.

FASTENERS

(Consumer discounts per cent off list prices, orders for 1 container for assorted sizes; for less than container quantities, add 25 per cent; attaching nuts to bolts, package sizes, add 7.5 per cent; heavy hex nut 1⅛ in. through 1½ in. tapped 8 threads, add 10 per cent)

HEX HEAD CAP SCREWS, coarse, or fine thread, packaged or bulk, with or without hex nuts, 1020 steel bright and high carbon heat treated, ¼ in. thru 1 in. diam., listed lengths:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

BOLTS, Standard stock sizes:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
*Bulk	50

*Hot galvanized or zinc plated lag bolts only — for package or bulk quantities use applicable list less bulk discounts.

CAP AND SETSCREWS,

Fillister Head, Cap Screws, Coarse Thread:

Packaged	+55
Bulk	+16

Flat Head Cap Screws: ¾ in. and smaller, 6 in. and shorter:

Packaged	+85
Bulk	+38

Setscrews, Square Head, Cup Point, Coarse Thread: Through 1 in. diam., 6 in. and shorter:

Packaged	+ 5
Bulk	19

Through 1 in. diam., longer than 6 in.:

Packaged	+29

HEXAGON NUTS, American Standard: Finished hex, hex jam, and hex slotted coarse or fine thread, ⅛ in. through 3 in., finished hex thick, thick and slotted, castle, fine thread, ¼ in. through 1½ in., semifinished hex heavy, heavy and jam, heavy and slotted, coarse thread, ¼ in. through 4 in., and

SQUARE NUTS, American Standard: Regular square and heavy square, coarse thread, ¼ in. through 2 in.:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over)

	Standard Diameter, Inches				
	1/4	5/16	3/8	7/16	1/2
Buffalo W12	$26.20	$38.50	$47.90	$61.30	$80.30
KansasCity,Mo. U3	26.20	38.50	47.90	61.30	80.30
Minnequa,Colo. C10	26.20	38.50	47.90	61.30	80.30
Pittsburg,Calif. C11	26.20	38.50	47.90	61.30	80.30
Roebling,N.J. R5	26.20	38.50	47.90	61.30	80.30
SparrowsPoint,Md. B2	26.20	38.50	47.90	61.30	80.30
St.Louis L8	26.20	38.50	47.90	61.30	80.30
Waukegan,Ill. A7	26.20	38.50	47.90	61.30	80.30

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut length 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.13
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	53.17	40.26
2¼	12	49.24	57.72	43.70
2½	12	54.23	63.57	48.13
2¾	12	58.73	68.83	52.13
3	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	Tee Rails All	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.65	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....	(16)6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....
Williamsport,Pa. S19	....	....	....	6.725

TIE PLATES

Fairfield,Ala. T2	....6.875
Gary,Ind. U5	....6.875
Lackawanna,N.Y. B2	..6.875
Minnequa,Colo. C10	...6.875
Seattle B3	....7.025
Steelton,Pa. B2	....6.875
Torrance,Calif. C11	...7.025

JOINT BARS

Bessemer,Pa. U5	....7.25
Fairfield,Ala. T2	....7.25
Joliet,Ill. U5	....7.25
Lackawanna,N.Y. B2	..7.25
Minnequa,Colo. C10	....7.25
Steelton,Pa. B2	....7.25

AXLES

Ind.Harbor,Ind. S13	..9.125
Johnstown,Pa. B2	....9.125

SCREW SPIKES

Lebanon,Pa. B2	....15.10

TRACK BOLTS, Untreated

Cleveland R2	....15.35
KansasCity,Mo. S5	...15.35
Lebanon,Pa. B2	....15.35
Minnequa,Colo. C10	...15.35
Pittsburgh S44	....15.35
Seattle B3	....15.85

STANDARD TRACK SPIKES

Fairfield,Ala. T2	....10.10
Ind.Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	...10.10
Lebanon,Pa. B2	....10.10
Minnequa,Colo. C10	...10.10
Pittsburgh J5	....10.10
Seattle B3	....10.60
S.Chicago,Ill. R2	....10.10
Struthers,O. Y1	....10.10
Youngstown R2	....10.10

Footnotes

(1) Chicago base.
(3) Merchant.
(4) Reinforcing.
(5) 1⅛ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in.; 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(6) Limited analyses only.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(12) Worcester, Mass., base.
(15) 5/8" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Deld. in mill zone, 5.65c.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds and 2½ in. and smaller hexagons; 9.65c for larger rounds and hexagons and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	1.5	+27	+10.5	+36	+21	+45.5	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.75		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 13.00c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	....	43.50	39.25	48.50	45.00
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	49.25
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	47.50
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	52.00
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	29.50	39.50	40.50	44.25	46.75	45.75	52.00	52.00
304L	....	37.25	47.25	48.25	52.00	54.50	53.50	59.75	59.75
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.75	75.75	71.75	80.75	80.75
316L	....	55.25	72.25	76.25	79.50	83.50	79.50	88.50	88.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.50	65.50
330	....	....	123.25	....	98.75	143.75	135.00	149.25	149.25
18-8 CbTa	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	79.25
403	....	....	29.25	....	33.25	35.00	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	29.25	31.00	33.25	35.00	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	40.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	51.75
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Somers Brass Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steel Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Steel Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates—Carbon Base 5%	10%	15%	20%	Sheets Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	49.80	61.35	72.80	84.40	....
Nickel	43.20	55.05	66.95	78.90	....
Nickel, Low Carbon	43.50	55.70	67.95	80.35	....
Monel	44.25	55.35	66.45	77.60	....

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	36.35	43.40

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. P4; Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	Hi-Carbon-Cr (D-11)	0.955
Spec. Carbon (W-1)	0.385	V-Cr Hot Work (H-13)	0.550
Oil Hardening (O-1)	0.505	W-Cr Hot Work (H-12)	0.530
V-Cr Hot Work (H-11)	0.505	W Hot Wk (H-21)	1.425-1.44

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	...	T-1	1.840
18	4	2	....	...	T-2	2.005
13.5	4	3	....	...	T-3	2.105
18.25	4.25	1	4.75	...	T-4	2.545
18	4	2	9	...	T-5	2.915
20.25	4.25	1.6	12.95	...	T-6	4.330
13.75	3.75	2	5	...	T-8	2.455
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

Prices in dollars per gross ton, f.o.b. (rail) furnace; add 50 cents when shipped by truck. Maximum delivered prices are approximate and based on rail shipment.

Birmingham District	Basic	No. 2 Foundry	Malleable	Bessemer
Birmingham R2	62.00	62.50**	66.50	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N. Tonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld.	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S. Chicago R2	66.00	66.50	66.50	67.00
S. Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	68.81	69.31	69.31	69.81
Muskegon, Mich., deld.	....	74.46	74.46	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
NewYork, deld.	....	75.41	75.91	....
Newark, N.J., deld.	72.53	73.03	73.53	74.03
Philadelphia, deld.	70.18	70.68	71.18	71.68
Troy, N.Y., R2	68.00	68.50	69.00	69.50
Boston, deld.	75.20	75.70	76.20	76.70
Pittsburgh District				
NevilleIsland, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), deld.	....	68.31	68.31	68.81
Monaca, Pa., deld.	....	68.33	68.33	68.83
Lawrenceville, W. Homestead, Wilmerding, Pa., deld.	....	68.68	68.68	69.18
Verona, Trafford, Pa., deld.	68.83	69.33	69.33	69.83
Brackenridge, Pa., deld.	69.16	69.66	69.66	70.16
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....

Other U. S. Districts	Basic	No. 2 Foundry	Malleable	Bessemer
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
GraniteCity, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	62.00	62.50‡	66.50	67.00
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....
Mansfield, Ohio, deld.	....	....	71.34	....
Canadian District				
Hamilton, Ont. S46	65.00	65.00	65.50	....
PortColborne, Ont. A25	65.00	65.00	65.50	66.00
SaultSte. Marie, Ont. A25	65.00	65.00	65.50	66.00

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 11.50%; starting with silicon over 11.50% add $1.50 per ton for each 0.50% silicon or portion thereof up to 14%; add $1 for each 0.50% Mn over 1%)

Buffalo H1	$79.25
Jackson, Ohio I-3 J1	78.00
PortColborne, Ont. A25	78.50

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

CalvertCity, Ky. P15	$99.00
NiagaraFalls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry. K2	89.00
Keokuk, Iowa O.H. & Fdry. 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Erie, Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
NevilleIsland, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	73.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb items (except stainless) ordered by themselves. Prices will vary with total weight of the order or weight of the individual items or both. Base quantities for stainless sheets: 8000 lb, except in Chicago, New York, Boston, Los Angeles, and San Francisco, 10,000 lb. City delivery charges are 15 cents per 100 lb except: Denver, 20 cents; Baltimore, Boston, New York, Philadelphia, San Francisco, 10 cents; Atlanta, Birmingham, Dallas, Houston, Los Angeles, Seattle, no charge.

	SHEETS				STRIP	BARS			STRUCTURAL	PLATES	
	Hot Rolled	Cold Rolled	Galv.	Stainless Type 302	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	SHAPES	Carbon	Floor
Atlanta	9.37	10.61	11.83	....	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	7.77	8.66	10.06	....	8.28	8.55	11.70	16.38	9.03	8.34	10.02
Birmingham	9.43	10.20	10.46	....	10.41	8.26	13.14	16.76	8.47	8.41	10.05
Boston	9.67	10.58	11.77	53.50	12.16	9.77	13.35	16.59	10.16	9.62	11.08
Buffalo	8.65	9.80	11.25	55.98	11.00	8.75	11.45	16.30	9.15	8.65	11.10
Charlotte, N. C.	9.87	11.22	10.30	....	10.86	9.67	12.68	....	9.88	9.82	11.46
Chicago	9.22	10.20	10.70	52.00	11.39	9.22	10.65	15.95	9.57	9.06	11.35
Cincinnati	8.74	10.26	10.20	65.30	11.06	8.87	11.53	16.27	9.47	8.79	11.01
Cleveland	8.57	9.88	11.24	56.18	10.86	8.66	11.25	16.06	9.30	8.65	10.92
Dallas	9.62	10.05	12.59	....	11.18	9.03	12.98	16.95	9.26	9.35	11.00
Detroit	9.48	10.46	11.05	52.00	11.76	9.53	11.01	16.23	10.14	9.43	11.61
Denver	9.41	11.77	12.11	....	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	9.22	9.65	12.19	52.00	10.78	8.63	13.10	16.55	8.86	8.95	10.60
Indianapolis	9.66	10.64	11.14	....	11.83	9.66	11.09	16.39	10.01	9.50	11.79
Kansas City	9.21	10.87	11.35	....	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	8.95	11.20	11.45	61.27	10.65	9.00	14.20	17.35	9.90	8.40	11.15
Memphis, Tenn.	8.98	10.05	....	....	10.64	8.82	12.74	....	9.01	8.66	11.41
Milwaukee	9.36	10.34	10.84	....	11.53	9.36	10.89	16.09	9.79	9.20	11.49
Moline, Ill.	8.92	10.55	10.50	....	10.90	8.90	11.00	16.30	9.26	8.76	10.96
Newark, N. J.	9.36	10.13	11.35	....	11.46	9.74	13.25	16.40	10.20	9.51	11.05
New York	9.36	10.13	11.35	52.98	11.46	9.74	13.25	16.40	10.20	9.51	11.05
Philadelphia	8.35	9.60	10.66	52.71	10.35	8.75	11.95	16.38	8.95	8.70	9.95
Pittsburgh	8.57	9.88	11.13	52.00	10.84	8.55	11.25	15.95	8.91	8.41	10.68
Portland, Oreg.	9.45	11.30	12.35	....	11.45	9.45	16.65	17.80	10.05	9.60	11.75
St. Louis	9.42	10.58	11.08	....	11.59	9.44	11.28	16.33	9.80	9.28	11.59
St. Paul	8.84	9.59	10.84	....	11.01	8.82	11.49	16.54	9.18	8.68	10.44
San Francisco	10.17	11.69	11.40	54.00	11.78	10.07	15.10	17.25	10.49	10.38	12.47
Seattle	10.51	11.57	12.50	54.02	11.95	9.94	16.20	17.80	10.65	10.10	12.73
Spokane, Wash.	10.36	11.42	12.35	54.02	11.80	9.79	16.20	17.80	10.50	9.95	12.58

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Los Angeles, Dallas and Houston, 10 Ga. x 48 x 120 in.; stainless, 16 Ga. & 36 in.; hot rolled strip, ⅛ in. x 1 in.; hot rolled carbon bars, rounds, ⅝ in.—1¼ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅜ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plates, sheared, through ½ in. x 84 in.; floor plates, ¼ in. x 36 in.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., $140; Salina, Pa., $145; Niles, Ohio, $146; Cutler, Utah, $175.

Super-Duty: Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Md., St. Louis, $185; Stevens Pottery, Ga., $195; Cutler, Utah, $248.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio, Hawstone, Pa., St. Louis, $158; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $163; E. Chicago, Ind., Joliet, Rockdale, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Super-Duty: Sproul, Hawstone, Pa., Niles, Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $158; Morrisville, Hays, Latrobe, Pa., $163; E. Chicago, Ind., St. Louis, $168; Canon City, Colo., $183; Curtner, Calif., $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $140; Philadelphia, Clearfield, Pa., $145.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Aisey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Pa., Vandalia, Mo., New Salisbury, Ohio, $37; Vanport, Pa., Wellsville, Irondale, Ohio, $100; Clearfield, Pa., Portsmouth, Ohio, $102; St. Louis, Mexico, Mo., $120.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., Danville, Ill., $250; Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $260.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., $320; Philadelphia, $325.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., $360; Philadelphia, $365.

Sleeves (per 1000)

St. Louis, $193; Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Clearfield, Pa., $234.

Dolomite (per net ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Nario, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.00.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ⅜ in. grains with fines: Baltimore (periclase), $73; Pascagoula, Miss. (periclase), $90.

*—9 in. x 4½ x 2.50 straights.

Ores

Lake Superior Iron Ore

(Prices effective for the 1960 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer	$11.60
Lump ½ in. and up	12.85
Fines, under ½ in.	10.72
Mesabi nonbessemer	11.45
Old Range bessemer	11.85
Old Range nonbessemer	11.70
Open-hearth lump	12.70
High phos.	11.45

Based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1960; increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

New Jersey, concentrates .....nom.

Foreign Iron Ore

Cents per unit

Swedish basic, 65%, c.i.f. Atlantic ports	23.00†
Chilean, 62-65%, c.i.f. Atlantic ports	22.00
Brazilian, 68.5% f.o.b. vessel, Victoria, per ton	$11.50

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$19.75-20.00*
Domestic, concentrates, f.o.b. milling points	22.00-23.00

Manganese Ore

Mn 46-48%, Indian, 85-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charlestown, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1	$34.00-35.00†
48% no ratio	25.00-26.00†

South African Transvaal

44% no ratio	18.75†
48% no ratio	24.00-26.00†

Turkish

48% 3:1	36.00-37.00†

Domestic

Rail nearest seller

18% 3:1	30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked $1.23

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

55-60%	$2.50-2.80
60-65%	2.80-3.20

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

*Before duty. †Nominal.

Electrodes

Threaded with nipple; unboxed, f.o.b. plant

GRAPHITE

Inches Diam	Length	Per 100 lb
2	24	$64.00
2½	30	41.50
3	40	39.25
4	40	37.00
5⅛	40	36.50
6	60	33.25
7	60	29.75
8, 9, 10	60	29.50
12	72	28.25
14	60	28.25
16	72	27.25
17	60	27.25
18	72	27.00
20	72	26.50
24	84	27.25

CARBON

8	60	14.25
10	60	13.80
12	60	14.75
14	60	14.75
14	72	12.55
17	60	12.65
17	72	12.10
20	90	11.55
24	72, 84	11.95
24	96	12.10
30	84	12.00
35, 40	110	11.60
40	100	12.50

Canadian Steel

(Cents per lb, f.o.b. mill, except as otherwise noted.)

Billets, Blooms & Slabs:

Carbon (N.T.):	
Forging	$97.00
Rerolling	78.00
Alloy (N.T.)	115.00
Wire Rods:	
Carbon	5.70
Alloy	6.40
Wire (carload lots):	
Merchant annealed	8.40
Low carbon indus.	7.20
Upholstery spring	8.55
M.B. spring	8.85
Bars & Small Shapes:	
Carbon, merchant	5.30
Carbon, special	5.85
Alloy	6.40
Bar Mill Bands:	
Carbon	5.40
Alloy	8.05
Bars, Reinforcing	5.30

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60%, $33-$36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade; European, $30-$33, contract; Mexican, all rail, duty paid, $28-$28.50; barge, Brownsville, Tex., $30-$31.

Metal Powder

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as noted.)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. trucklots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85‡
40 mesh, bags	8.10††
Electrolytic Iron,	
Melting stock, 99.9% Fe, irreg. fragments, ⅛ in. x 1.3 in.	28.75
(In contract lots of 750 tons price is 22.75c.)	
Annealed, 99.5% Fe	.36.75, ton, del. east of Mississippi.
Unannealed (99+% Fe)	33.0
Unannealed (99+% Fe) (minus 325 mesh)	58.0
Carbonyl Iron: 90-99.9%, 3 to 20 microns, depending on grade, $8.00-700.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum: Atomized, 600-lb drum freight allowed, c.l. 39.80; ton lots	41.80
Brass, 80/20, leaded (60 mesh)	37.50
Bronze powder, 90/10.	55.10
Copper, all types	15.25*
Lead	7.50*
Manganese, minus 35 mesh	1.00
Nickel, all types	0.78-1.06
Nickel-Silver	58.70
Solder	7.50*
Stainless Steel, 304	89.00
Stainless Steel, 316	$1.07
Steel, AISI 4650	32.00
Tin	14.00*
Zinc	24.20

Cobalt:	Dollars
98.5%, minus 100-300 mesh	1.57-1.58
99.5%, below 5 microns	2.32
Tungsten	nom.
Molybdenum	4.35

*Plus cost of metal. ‡Depending on mesh. §Cutting and scarfing grades. **Depending on price of ore. ††Welding grade.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace	$14.75-15.25
Connellsville, Pa., foundry	18.00-18.50

Oven Foundry

Birmingham, ovens	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Chattanooga, Tenn., ovens	30.80
Detroit, ovens	32.00
Pontiac, Mich., deld.	34.05
Saginaw, Mich., deld.	35.63
Erie, Pa., ovens	32.00
Everett, Mass., ovens:	
New England, deld.	33.55*
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.64
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens	30.75
Painesville, Ohio, ovens	32.00
Cleveland, deld.	34.45
Philadelphia, ovens	31.00
St. Louis, ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.78
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., ovens	31.25

*Within $5.25 freight zone from works.

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

	North Atlantic	Great Lakes*	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$5.62	....	$5.52	$5.37	$5.72
Bar Size Angles	5.75	....	5.65	5.50	5.85
Structural Angles	5.65	....	5.55	5.40	5.75
I-Beams	5.65	....	5.55	5.40	5.75
Channels	5.65	....	5.55	5.40	5.75
Plates (basic bessemer)	5.70	....	5.60	5.45	5.80
Sheets, hot rolled and galvanized	Nom.	....	Nom.	Nom.	Nom.
Furring Channels, C.R., 1000 ft. ⅞ x 0.30 lb per ft	25.20	....	24.40	24.40	25.20
Barbed Wire (†)	6.50	....	6.40	6.25	6.60
Merchant Bars	5.75	....	5.65	5.50	5.85
Hot-Rolled Bands	5.85	....	5.75	5.60	5.95
Wire Rods, Thomas Commercial No. 5	5.80	....	5.75	5.75	6.00
Wire Rods, O. H., No. 5	6.00	....	5.95	5.95	6.25
Bright Common Wire Nails (‡)	6.85	....	6.75	6.60	6.95

*Book closed for 1960-61 shipping season. †Per 82 lb net reel. ‡Per 100-lb keg, 20d nails and heavier.

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.	
Pure benzene	34.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg.	6.00
Toluene, one deg. (deld. east of Rockies)	25.00
Cents per lb, f.o.b. tank cars or tank trucks, deld.	
Phenol, 90 per cent grade	14.75
Per net ton bulk, f.o.b. cars or trucks, plant.	
Ammonium sulfate, regular grade	$32.00

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, 10 lb pigs, per gross ton, Palmerton, Pa. 21-23% Mn, $102.50; 19-21% Mn, 1-3% Si, $100; 16-19% Mn $98. For Neville Island, Pa., prices add $2.50 as of Feb. 1. Lump 35 lb and down: Deduct $2 from 10 lb pig prices at Palmerton.

Standard Ferromanganese: (Mn 74-76%, C 7% approx) base price per net ton, $220, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively (Min 79-81%). Lump $228 per net ton, f.o.b. Anaconda, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%. fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-95%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 4c for max 0.15% C grade from above prices, 5.3c for max 0.03% C, 6.6c for max 0.5% C, and 8.1c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 24c per lb of contained Mn; packed, carload 25.3c, ton lot 26.9c, less ton 28.1c.

Electrolytic Manganese Metal: Min carload, bulk, 34.25c; 2000 lb to min carload, 37c; less ton, 39c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi River; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Carload, lump, bulk, 1.50% C grade, 18.5-21% Si, 11.6c per lb of alloy. Packed, c.l. 12.8c, ton 13.25c, less ton 14.25c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 16-18.5%, deduct 0.3c from above prices. For 3% grade, Si 12.5-16% deduct 0.5c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton to 300 lb, $1.55. (Ti 38-43%, Al 5% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton to 300 lb $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract min c.l. $250 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis. Spot, $255.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4%). Contract, c.l. $300 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed. Spot, $305.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: C.l. lump, bulk, 28.75c per lb of contained Cr. Delivered.

Charge Chrome: Cr 50-56%, C 6-8%, Si 4-7%, 22.00c; Cr 58-63%, C 5.8%, Si 3-6%, 22.50c per lb of contained Cr, carlots, lump, bulk, delivered.

Blocking Chrome: Cr 55-63%, C 4-6%, Si 8-12%. 23.50c per lb of contained Cr, delivered in carlots, lump, bulk.

Refined Chrome: Cr 53-63%, C 3-5%, Si 2.5% max, 26.00c per lb of contained Cr, delivered in carlots, lump, bulk.

Low-Carbon Ferrochrome: Cr 63-66% (Simplex), carload, lump, bulk, C 0.025% max, 33.50c per lb contained Cr; 0.010% max, 34.50c. Delivered.

Cr, 65-71%, carload, lump, bulk, 0.025% max, 35.00c; 0.05% max, 34.00c; 0.10% max, 33.75c; 0.20% max, 33.50c; 0.50% max, 33.25c; 1.0% max, 33.00c; 1.5% max, 32.75c; 2.0% max, 32.50c. Delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). C.l., 2" x D, bulk 30.8c per lb of contained Cr. Packed, c.l. 32.4c, ton 34.2c, less ton 35.7c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max). 8M x D, carload, bulk, 20.05c per lb of alloy carload packed 21.25c, ton lot 22.50c, less ton lot 23.70c. Delivered. Spot, add 0.25c.

Ferrochrome-Silicon: Cr 39-41%, Si 42-45%, C 0.05% max, 24.50c per lb contained Cr and 14.60c per lb contained Si; Cr 33-36%, Si 45-48%, C 0.05% max, 24.50c per lb contained Cr, 14.60c per lb contained Si; 0.75 in. x down, 26.25c per lb contained Cr, 14.60c per lb contained Si.

Chromium Metal, Electrolytic: Commercial grade (C 99.8% min, metallic basis Fe 0.2% max). Contract, carlot packed, 2" x D plate (above ⅛" thick) $1.15 per lb, ton lot $1.17, less ton lot $1.19. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5 freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Carload, lump, bulk, 14.8c per lb contained Si. Packed, c.l. 17.1c, ton lot 18.55c, less ton 20.20c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Chattanooga, Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Keokuk, Iowa; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Carload, lump, bulk, 15.75c per lb contained silicon. Packed, c.l. 17.75c, ton lot 19.55c, less ton 20.9c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Carload, lump, bulk, 16.9c per lb of contained Si. Packed, c.l. 18.8c, ton lot 20.45c, less ton 21.7c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Carload, lump, bulk, 20c per lb of contained Si. Packed, c.l. 21.65c, ton lot 23.05c, less ton 24.1c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 1.00% max Fe, 0.7% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Add 0.5c for 0.50% Fe grade analyzing 98.25% min Si.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.85c per lb of alloy; ton lots, packed, 10.85c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l., lump, bulk, 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Carload, bulk, 26.25c per lb of alloy, carload, lump, packed 27.25c, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: 100 lb or more packed (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload, $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Carbortam: (B 1 to 2%). Lump, carload $320 per ton, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

BRIQUETED ALLOYS

Chromium Briquets: (Weighing approx 3¾ lb each and containing 2 lb of Cr). Carload, bulk 19.60c per lb of briquet, in bags 20.70c; 3000 lb to c.l. pallets 20.80c; 2000 lb to c.l. in bags 21.90c; less than 2000 lb in bags 22.80c. Delivered. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Carload, bulk 13.7c per lb of briquet; c.l. packed, bags 14.9c; 3000 lb to c.l., pallets 14.9c; 2000 lb to c.l., bags 16.1c; less ton 17c. Delivered. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). C.l. bulk 14c per lb briquet; c.l. packed, bags 15.2c; 3000 lb to c.l., pallets 15.2c; 2000 lb to c.l., bags 16.4c; less ton 17.3c. Delivered. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si and small sizes, weighing approx 2½ lb and containing 1 lb of Si). Carload bulk 8c per lb of briquet; packed, bags 9.2c; 3000 lb to c.l., pallets 9.6c; 2000 lb to c.l., bags 10.8c; less ton 11.7c. Delivered. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.49 per lb of Mo contained, f.o.b. Langeloth, Pa.

Titanium Briquets: Ti 98.27%, $1 per lb f.o.b. Niagara Falls, N. Y.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). 5000 lb W or more $2.15 per lb, (nominal) of contained W. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 4% max, C 0.1% max). Ton lots 2" x D, $3.45 per lb of contained Cb; less ton lots $3.50 (nominal). Delivered.

Ferrotantalum Columbium: (Cb 44-77% approx, Ta 15% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D, $3.05 per lb of contained Cb plus Ta, delivered; less ton lots, $3.10.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Carload, bulk 19.25c per lb of alloy, c.l. packed ½ in. x 12 M 20.00c, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 20% per lb of alloy, ton lot 21.15c; less ton lot 22.4c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

V-3 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.45c per lb of alloy; ton lot 19.95c; less ton lot 21.20c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Siminal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk, 19.25c. Packed c.l. 20.25c; 2000 lb to c.l. 21.25c; less than 2000 lb 21.75c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $5 for each 1% of P above or below the base). Carload, bulk, f.o.b. sellers' works, Mt. Pleasant, Sigio, Tenn., $120 per gross ton.

Ferromolybdenum: (65-75%). Per lb of contained Mo in 200-lb container, f.o.b. Langeloth and Washington, Pa., $1.76 in all sizes except powdered which is $1.82.

Technical Molybdic-Oxide: Per lb of contained Mo, in cans $1.47; in bags, $1.46, f.o.b. Langeloth and Washington, Pa.

Quality plus economy when you buy SUMITOMO steel wire rods

Rapid developments in the wire-product field have increased industry's demand for top-quality steel wire rods. Because of its international reputation for reliability, Sumitomo Metal supplies world markets — America in particular — with 7,000 tons of wire rods every month. To keep up with this export demand, Sumitomo Metal has added to its present facilities another new wire rod mill, completely equipped with the most modern machinery available.

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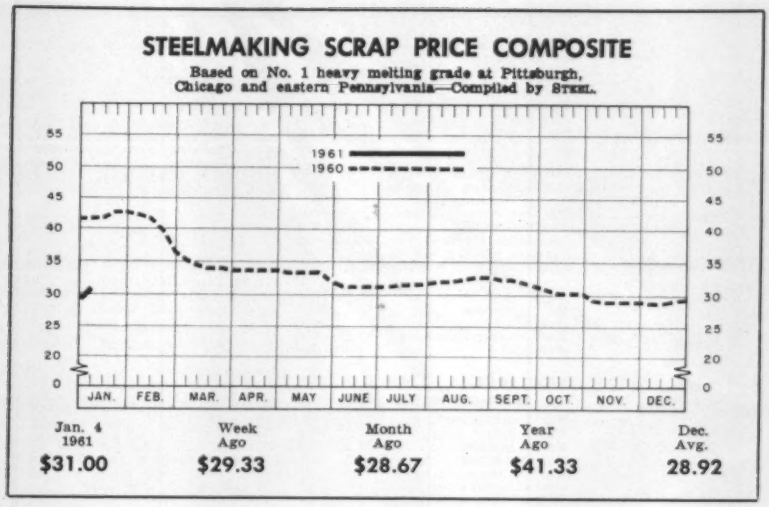

Scrap Staging Show of Strength

Prices are up sharply at some points on factory material, giving lift to market generally despite absence of active mill buying. Brokers expect pickup in steel operations

Scrap Prices, Page 108

● **Pittsburgh** — The market is stronger, but there's an undercurrent of uneasiness. Sellers fear steelmaking operations may not emerge from the doldrums for a month or two and that there won't be enough mill buying in the interim to hold prices at the higher levels reached in early January.

No. 1 heavy melting advanced $3 (to $30 a ton) on a broker's purchase for a mill on the fringe of the district. The local plant of GM's Fisher Body Div. sold its January output of No. 1 factory bundles to brokers for about $34.75 a ton—up $5.25 from the December price but only $2.25 more than was paid recently for surplus December tonnage. Consumers are reportedly unwilling to pay more than $36 for the material—$1 a ton less than the brokers are asking. Although brokers are offering $23 a ton for No. 2 bundles, there have been no sales to mills confirmed at more than $21.

● **Chicago**—The firming up of the scrap market which started in late December is continuing. Quotations on leading steelmaking grades have advanced in that time $1 to $3 a ton on leading steelmaking grades, $2 on foundry grades, and $5 on specialties. There's some question whether the new level can be sustained since it is not supported by consumer buying.

The rise was touched off by broker buying. Some material was needed to complete outstanding contracts and some reportedly to meet export demand. The stronger market was bolstered when a broker successfully bid $32.19 for 10,000 tons of No. 1 factory bundles to be produced by auto stamping plants in January. The bid compared with $26.59 a ton a month previously. Delivery charges to Chicago figure $2.60 a ton.

A district mill announced $30 as its January buying price for No. 1 industrial heavy melting steel, which its customers return on a selective basis.

● **Philadelphia**—Prices on the major steel grades are unchanged with the market on the strong side. Actually, couplers, springs, and wheels are higher at $38-$39, delivered. Structurals and plates are off slightly to $36-$39 delivered.

● **New York** — Brokers have advanced their buying prices on No. 2 heavy melting steel to $19-$20. Otherwise, prices are unchanged, with domestic demand dull.

● **Cleveland**—The market is decidedly stronger, largely because of sales of automotive stamping plant scrap at sharply higher prices. One plant sold 8000 tons at $31.75 a ton, up $5.50 from a month ago, while three others sold 11,000 tons at $30.50, about $5 above the price received at the start of December.

The strength in industrial scrap, of course, has extended to dealer steelmaking grades, but in the absence of strong mill demand, there is some uncertainty about the exact level of the market. Brokers and dealers are pegging their prices higher, but they are largely nominal in the absence of a thorough buying test.

● **Youngstown** — A sale of No. 1 industrial heavy melting scrap to a major Valley steelmaker was reported here at $35 a ton. That's $5 above the previous level and has served to buoy the market.

● **Detroit** — The market appears to be stronger although there is little trading at the dealer-broker level. However, dealer-broker prices are up $3 to $5 a ton following the movement of Chrysler's No. 1 factory bundles at the start of the month at $31.50.

● **Buffalo** — Prices are somewhat firmer in this market, although there is little for brokers and dealers to cheer about. Market firmness seems to come from fairly strong export demand which is pulling a considerable volume of scrap to the Atlantic Seaboard.

● **Cincinnati** — Prices are stronger. An advance of $1 a ton in anticipation of mill buying has been confirmed, and another $1 a ton has been added to the list. No. 1 heavy melting is quoted $23.50-$24.50, brokers' buying price. An area mill has a limited buying program for No. 1 steel at a price $2 higher than a month ago price levels.

● **St. Louis** — The market is showing new strength. Prices are up $3 to $5 a ton on the dealer-broker level. No change is reported at the

(Please turn to Page 113)

Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, Jan. 4, 1961. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Jan. 4	$31.00
Dec. 28	29.33
Dec. Avg.	28.92
Jan. 1960	41.92
Jan. 1956	52.17

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	*29.00-30.00*
No. 2 heavy melting	*24.00-25.00*
No. 1 dealer bundles	*29.00-30.00*
No. 2 bundles	*23.00-24.00*
No. 1 busheling	*29.00-30.00*
No. 1 factory bundles	*35.00-36.00*
Machine shop turnings	11.00-12.00
Mixed borings, turnings	11.00-12.00
Short turnings	15.00-16.00
Cast iron borings	15.00-16.00
Cut structurals:	
2 ft and under	*32.00-33.00*
3 ft and under	*31.00-32.00*
Heavy turnings	27.00-28.00
Punchings & plate scrap	*35.00-36.00*
Electric furnace bundles	*36.00-37.00*

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	31.00-32.00
Stove plate	27.00-28.00
Unstripped motor blocks	22.00-23.00
Clean auto cast	31.00-32.00
Drop brcken machinery	44.00-45.00‖

Railroad Scrap

No. 1 R.R. heavy melt.	29.00-30.00
Rails, 2 ft and under	*46.00-47.00*
Rails, 18 in. and under	*47.00-48.00*
Random rails	41.00-42.00
Angles, splice bars	37.00-38.00
Railroad specialties	39.00-40.00
Rails, rerolling	53.00-54.00

Stainless Steel Scrap

18-8 bundles & solids	175.00-180.00
18-8 turnings	95.00-100.00
430 bundles & solids	90.00-95.00
430 turnings	50.00-55.00

CHICAGO

No. 1 hvy melt., indus.	*29.00-30.00*
No. 1 hvy melt., dealer	*27.00-28.00*
No. 2 hvy melting	*25.00-26.00*
No. 1 factory bundles	*33.75-34.75*
No. 1 dealer bundles	*28.00-29.00*
No. 2 bundles	*19.00-20.00*
No. 1 busheling, indus.	*29.00-30.00*
No. 1 busheling, dealer	*27.00-28.00*
Machine shop turnings	*12.00-13.00*
Mixed borings, turnings	*14.00-15.00*
Shovel turnings	*14.00-15.00*
Cast iron borings	*14.00-15.00*
Cut structurals, 3 ft	*33.00-34.00*
Punchings & plate scrap	*35.00-36.00*

Cast Iron Grades

No. 1 cupola	*38.00-39.00*
Stove plate	*32.00-33.00*
Unstripped motor blocks	*30.00-31.00*
Clean auto cast	*43.00-44.00*
Drop broken machinery	*43.00-44.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*32.00-33.00*
R.R. malleable	*42.00-43.00*
Rails, 2 ft and under	*44.00-45.00*
Rails, 18 in. and under	*45.00-46.00*
Angles, splice bars	*39.00-40.00*
Axles	*53.00-54.00*
Rails, rerolling	*53.00-54.00*

Stainless Steel Scrap

18-8 bundles, solids	*165.00-170.00*
18-8 turnings	90.00-95.00
430 bundles & solids	*80.00-85.00*
430 turnings	40.00-45.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*20.00-21.00*
No. 2 heavy melting	*15.00-16.00*
No. 1 bundles	*21.00-23.00*
No. 2 bundles	*12.00-13.00*
No. 1 busheling	*19.00-20.00*
Machine shop turnings	*6.00-7.00*
Mixed borings, turnings	*6.00-7.00*
Shovel turnings	*7.00-8.00*

Cast Iron Grades

No. 1 cupola	*29.00-30.00*
Stove plate	*23.00-24.00*
Heavy breakable	*22.00-23.00*
Unstripped motor blocks	*18.00-19.00*
Charging box cast	*24.00-25.00*
Clean auto cast	*35.00-36.00*

CLEVELAND

No. 1 heavy melting	*26.00-27.00*
No. 2 heavy melting	19.00-20.00†
No. 1 factory bundles	*32.00-33.00*
No. 1 bundles	*27.00-28.00*
No. 2 bundles	16.00-17.00
No. 1 busheling	*27.00-28.00*
Machine shop turning.	10.00-11.00
Shovel turnings	14.00-15.00
Mixed borings, turnings	14.00-15.00
Cast iron borings	14.00-15.00
Cut foundry steel	*29.00-30.00*
Cut structurals, plate 2 ft and under	*36.00-37.00*
Low phos. punchings & plate	*28.00-29.00*
Alloy free, short shovel turnings	14.00-15.00
Electric furnace bundles	*28.00-29.00*

Cast Iron Grades

No. 1 cupola	37.00-38.00
Charging box cast	24.00-25.00
Heavy breakable cast	26.00-27.00
Stove plate	34.00-35.00
Unstripped motor blocks	*29.00-30.00*
Brake shoes	35.00-36.00
Clean auto cast	*43.00-44.00*
Burnt cast	30.00-31.00
Drop broken machinery	*44.00-45.00*

Railroad Scrap

R.R. malleable	42.00-43.00
Rails, 2 ft and under	45.00-46.00
Rails, 18 in. and under	45.00-46.00
Rails, random lengths	38.00-39.00
Cast steel	*34.00-35.00*
No. 1 railroad cast	42.00-43.00
Railroad specialties	*40.00-41.00*
Angles, splice bars	*39.00-40.00*
Rails, rerolling	51.00-52.00

Stainless Steel Scrap (Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	150.00-155.00
18-8 turnings	65.00-70.00
430 clips, bundles, solids	65.00-70.00
430 turnings	10.00-20.00

YOUNGSTOWN

No. 1 heavy melting	*30.00-31.00*
No. 2 heavy melting	21.00-22.00
No. 1 busheling	*32.00-33.00*
No. 1 bundles	*32.00-33.00*
No. 2 bundles	20.00-21.00
Machine shop turnings	12.00-13.00
Shovel turnings	17.00-18.00
Cast iron borings	17.00-18.00
Low phos.	*33.00-34.00*
Electric furnace bundles	*33.00-34.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*31.00-32.00*

BUFFALO

No. 1 heavy melting	23.00-24.00
No. 2 heavy melting	19.00-20.00
No. 1 bundles	23.00-24.00
No. 2 bundles	16.00-17.00
No. 1 busheling	23.00-24.00
Shovel turnings	13.00-14.00
Machine shop turnings	9.00-10.00
Cast iron borings	11.00-12.00
Low phos. structurals and plates, 2 ft and under	33.00-34.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	36.00-37.00
No. 1 machinery	43.00-44.00

Railroad Scrap

Rails, random lengths	36.00-37.00
Rails, 3 ft and under	42.00-43.00
Railroad specialties	35.00-36.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*23.50-24.50*
No. 2 heavy melting	*20.50-21.50*
No. 1 bundles	23.50-24.50
No. 2 bundles	*16.00-17.00*
No. 1 busheling	*23.50-24.50*
Machine shop turnings	8.00-9.00
Mixed borings, turnings	8.00-9.00
Shovel turnings	10.00-11.00
Cast iron borings	10.00-11.00
Low phos. 18 in.	31.00-32.00

Cast Iron Grades

No. 1 cupola	34.00-35.00
Heavy breakable cast	28.00-29.00
Charging box cast	34.00-35.00
Drop broken machinery	44.00-45.00

Railroad Scrap

No. 1 R.R. heavy melt.	*29.00-30.00*
Rails, 18 in. and under	44.00-45.00
Rails, random lengths	36.00-37.00

PHILADELPHIA

No. 1 heavy melting	35.00
No. 2 heavy melting	31.00
No. 1 bundles	36.00
No. 2 bundles	21.00
No. 1 busheling	36.00
Electric furnace bundles	37.00
Mixed borings, turnings	14.00†
Shovel turnings	18.00†
Machine shop turnings	13.00†
Heavy turnings	25.00†
Structurals & plates	*36.00-39.00*
Couplers, springs, wheels	*38.00-39.00*
Rail crops, 2 ft & under	46.00-48.00

Cast Iron Grades

No. 1 cupola	38.00
Heavy breakable cast	39.00
Drop broken machinery	47.00-48.00
Malleable	46.00†

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	27.00-28.00
No. 2 heavy melting	*19.00-20.00*
No. 1 bundles	27.00-28.00
No. 2 bundles	14.00-15.00
Machine shop turnings	3.50-4.00†
Mixed borings, turnings	4.00-4.50†
Shovel turnings	5.00-6.00†
Low phos. structurals & plates	31.00-32.00†

Cast Iron Grades

No. 1 cupola	34.00-35.00
Unstripped motor blocks	23.00-24.00
Heavy breakable	28.00-29.00

Stainless Steel

18-8 sheets, clips, solids	140.00-145.00†
18-8 borings, turnings	70.00-75.00†
410 sheets, clips, solids	40.00-45.00
430 sheets, clips, solids	50.00-55.00†

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	23.00-24.00
No. 2 heavy melting	19.00-20.00
No. 1 bundles	23.00-24.00
No. 1 busheling	23.00-24.00
Machine shop turnings	5.00-6.00
Shovel turnings	9.00-9.50
No. 1 cast	39.00-40.00
Mixed cupola cast	30.00-30.50
No. 1 machinery cast	40.00-42.00

BIRMINGHAM

No. 1 heavy melting	28.00-29.00
No. 2 heavy melting	22.00-23.00
No. 1 bundles	28.00-29.00
No. 2 bundles	20.00-21.00
No. 1 busheling	29.00-30.00
Cast iron borings	10.00-11.00
Machine shop turnings	15.00-16.00
Shovel turnings	18.00-19.00
Bar crops and plate	35.00-36.00†
Structurals & plate	35.00-36.00†
Electric furnace bundles	30.00-31.00†
Electric furnace:	
3 ft and under	31.00-32.00
2 ft and under	33.00-34.00

Cast Iron Grades

No. 1 cupola	41.00-42.00†
Stove plate	41.00-42.00†
Unstripped motor blocks	30.00-31.00†
No. 1 wheels	34.00-35.00

Railroad Scrap

No. 1 R.R. heavy melt.	32.00-33.00
Rails, 18 in. and under	43.00-44.00
Rails, random lengths	36.00-37.00
Angles, splice bars	36.00-37.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	27.00
No. 2 heavy melting	25.00
No. 1 bundles	28.00
No. 2 bundles	18.00
No. 1 busheling	28.00
Machine shop turnings	8.00
Shovel turnings	10.00

Cast Iron Grades

No. 1 cupola	36.00
Charging box cast	33.00
Heavy breakable cast	31.00
Unstripped motor blocks	33.00
Clean auto cast	39.00
Stove plate	34.00

Railroad Scrap

No. 1 R.R. heavy melt.	29.00
Rails, random lengths	*39.00*
Rails, rerolling	*46.00*
Rails, 18 in. and under	*41.00*
Angles, splice bars	*37.00*

HOUSTON

(Brokers' buying prices; f.o.b. car)

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	29.00
No. 1 bundles	31.00-32.00
No. 2 bundles	18.00-19.00
Machine shop turnings	7.00-8.00†
Low phos. plate & structurals:	
3 ft	34.00
2 ft and under	36.00-37.00

Cast Iron Grades

No. 1 cupola	33.00-33.50
Heavy breakable	24.00
Foundry malleable	29.00-30.00†
Unstripped motor blocks	27.00-27.50

Railroad Scrap

No. 1 R.R. heavy melt.	32.00-33.00

LOS ANGELES

No. 1 heavy melting	33.00*
No. 2 heavy melting	29.00*
No. 1 bundles	28.00†
No. 2 bundles	22.00*
Machine shop turnings	12.00†
Shovel turnings	14.00†
Cast iron borings	12.00†
Cut structurals and plate 1 ft and under	41.00†

Cast Iron Grades

No. 1 cupola	*37.00*

Railroad Scrap

No. 1 R.R. heavy melt.	40.00†

PORTLAND, OREG.

(Prepared, f.o.b. car)

No. 1 heavy melting	36.00
No. 2 heavy melting	34.00
No. 2 bundles	19.00
Shovel turnings	13.00
Electric furnace bundles	46.00

Cast Iron Grades

No. 1 cupola	31.50
Heavy breakable	31.00
Unstripped motor blocks	31.00
Stove plate (f.o.b. plant)	18.00

SEATTLE

(Prepared, f.o.b. car)

No. 1 heavy melting	36.00
No. 1 (prepared for shears)	33.00
No. 1 hvy (unprepared)	33.00
No. 2 heavy melting	34.00
No. 2 hvy (unprepared)	30.00
No. 2 bundles	20.00
Shovel turnings	15.00
Electric furnace bundles	46.00

Cast Iron Grades

No. 1 cupola	31.50
Heavy breakable cast	33.00
Unstripped motor blocks	30.00
Stove plate (f.o.b. plant)	20.00

SAN FRANCISCO

No. 1 heavy melting	32.00
No. 2 heavy melting	29.00
No. 1 bundles	27.00-28.00
No. 2 bundles	18.00
Machine shop turnings	14.00
Mixed borings, turnings	14.00
Cast iron borings	14.00
Heavy turnings	14.00
Shovel turnings	14.00
Cut structurals, 3 ft	40.00

Cast Iron Grades

No. 1 cupola	46.00-48.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	45.00-46.00
No. 1 wheels	34.00

HAMILTON, ONT.

(Brokers' buying prices; net tons)

No. 1 heavy melting	24.00
No. 2 hvy melt, 2 ft & under	22.50
No. 1 bundles	24.00
No. 2 bundles	17.00
Mixed steel scrap	16.00
Mixed borings, turnings	12.00
Busheling, new factory: Prepared	23.00
Unprepared	18.00
Shovel turnings	12.00

Cast Iron Grades‡

No. 1 machinery cast	30.00

*For export add $4 dock charges.
†Nominal.
‡F.o.b. Hamilton, Ont.
‖Delivered.

LOOK TO LURIA

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Questions Cloud '61 Outlook

Nonferrous Metal Prices, Pages 112 & 113

ANY FORECAST of the 1961 nonferrous market is fraught with hazard.

How will business be this year? When will the consumer inventory reduction end? How is steel going to do? How many autos will Detroit produce? What, and how much, will the military buy? Finally, what is Charlie Consumer going to do—spend his surplus cash or bank it?

Producers of aluminum, copper, lead, and zinc look for a mild pickup. (See STEEL, Jan. 2, p. 304.)

Nickel, cadmium, and titanium demand should be good. Bismuth and tellurium sales are expected to rise (STEEL, Dec. 26, 1960, p. 94).

To round out the outlook for 1961:

• **Magnesium**—Primary production increased 28 per cent to 40,000 tons in 1960, reflecting more workoff of producer stocks. Primary shipments totaled 51,500 tons, up 8 per cent. Consumption of both primary and secondary metal was about 50,000 tons. Wrought product shipments were down about 4 per cent (to 10,650 tons), and casting shipments fell 13 per cent to around 12,000 tons.

This year, primary production will be about the same. So will consumption of primary and secondary metal. Diecasting usage will probably increase. Prices look stable.

• **Molybdenum** — Foreign sales buoyed the market last year. U. S. 1960 consumption was about the same as it was in 1959—34 million lb. But foreign sales jumped from 24 million lb in 1959 to 38 million lb last year. Free World production (72 million lb) was about in balance with consumption.

Consumption and production this year should wind up about on a par with the 1960 pace. U. S. demand is expected to start slowly and increase over the year. Foreign sales will be at a high level early and taper off as the year progresses.

• **Mercury** — The sales trend has been down. Consumption in 1960 dropped below 50,000 flasks for the first time since 1954. Chief reason: No new industrial installations or expansions requiring the metal. Mine production rose slightly; imports were down. In 1960, we had the lowest average mercury price since 1953.

Supplies will be ample this year. Producer stocks are moderately high. Capacity is greater than any potential demand. There will probably be a gradual rise in prices. Look for them to range between $209 and $230 a flask over the year.

• **Tin**—Better sales are predicted for 1961, mainly because of higher demand expected from steelmakers. Demand for tin plate took a dive in the latter part of 1960, after having run at near record levels earlier in the year. Total tin consumption, however, was up, hitting 81,000 long tons (52,000 primary and 29,000 secondary) compared with 77,375 tons in 1959.

Supply and price in 1960 will pretty much depend on the policies and actions of the International Tin Council, which, in effect, controls both. Most metalmen believe supply will be adequate, barring serious political turmoil in the Far East. The price should average $1 to $1.03 a pound.

How Other Selected Metals Will Do

Antimony: 1960: Production up; consumption off slightly. **1961:** Little improvement expected.

Thallium: 1960: Production and consumption about on par with 1959's. **1961:** Demand about the same as 1960's.

Indium: 1960: Production and consumption almost identical with 1959's. **1961:** Demand should rise.

Gallium: 1960: Little change in either demand or production from the preceding year's. **1961:** Ditto.

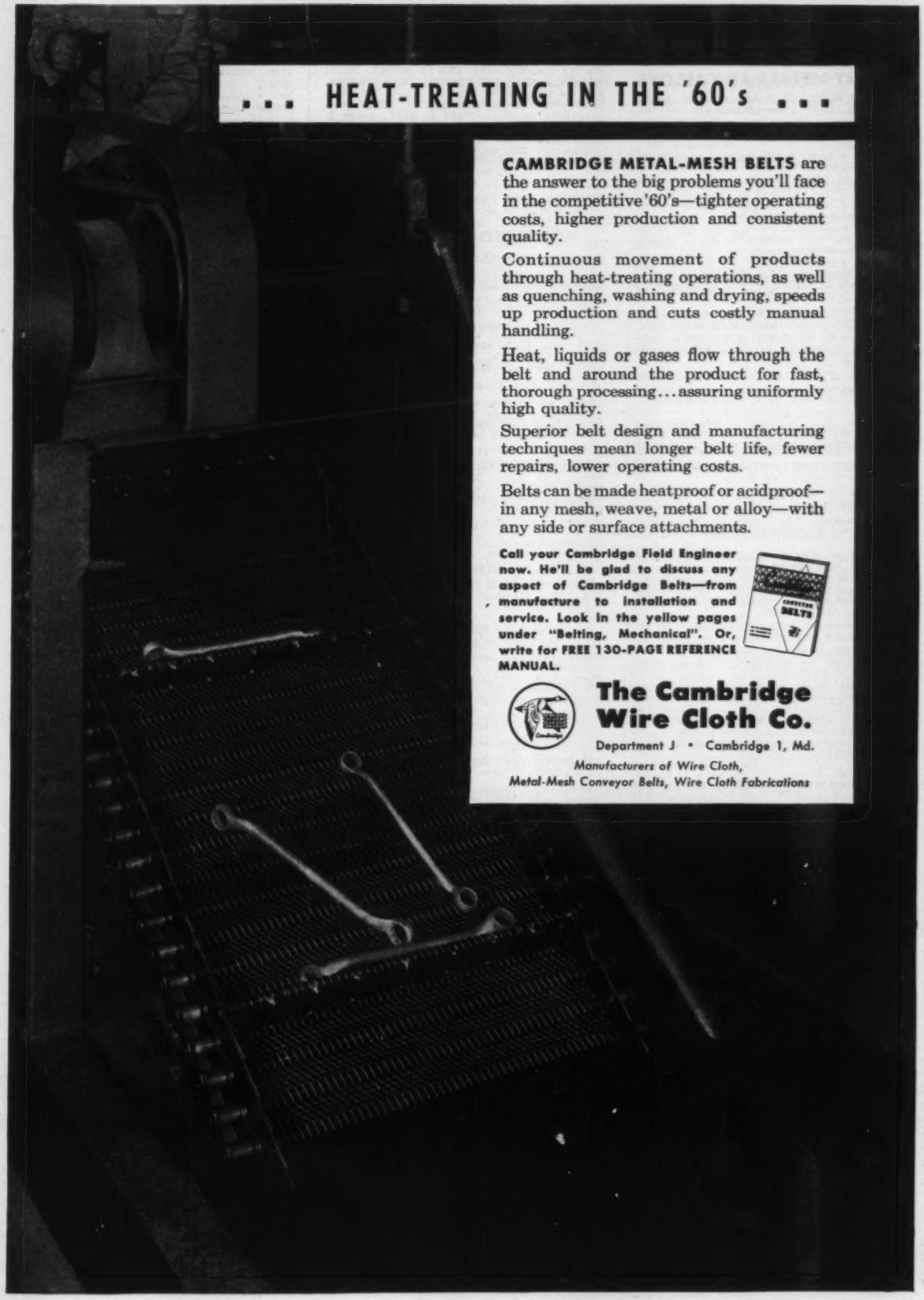
Rhenium: 1960: Production and sales held about even with 1959's. **1961:** Demand should increase.

Zinc Market in Tizzy

Another bombshell hit the already battered zinc market last week. In an unprecedented move, St. Joseph Lead Co. announced that it is granting a $10 a ton (or 0.5 cent a pound) discount on all zinc grades below the published *E.&M.J.* East St. Louis, Ill., price.

The quoted price of zinc (now 12 cents a pound for Prime Western) has tumbled twice in the last month, after having stayed at 13 cents a pound for almost a year. Poor sales, weak prices overseas, the ending of strikes at some U. S. facilities, and price discounting all contributed.

A stepup in price discounting is what led to its move, says St. Jo. Some of the major zinc users had been offered contracts guaranteeing a price of 0.25 to 0.50 cent a pound under the *E.&M.J.* quotation, no matter how far it might fall. Dropping the quoted price would just lower the *E.&M.J.* quotation, not stop the discounts, says St. Jo. The company hopes its move will.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Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, 50 lb ingots, 26.00, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 25.90; No. 43, 26.20; No. 195, 27.60; No. 214, 31.50; No. 356, 26.80, 50 lb ingots.

Antimony: R.M.M. brand, 99.5%, 29.00; Lone Star brand, 29.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 27.50-28.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $70.00 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.60 per lb deld.

Cobalt: 99+%, $1.50 per lb for 500-lb keg; $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $55 per lb and up nom.

Copper: Electrolytic, 30.00 deld.; custom smelters, 30.00; lake, 30.00 deld.; fire refined, 29.75 deld.

Germanium: First reduction, ingots, less than 1 kg, 36.00-37.50 per gram; 1-10 kg, 30.50-32.00 per gram; 10 kg or more, 28.10-29.99 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $70-75 per troy oz nom.

Lead: Common, 10.80; chemical, 10.90; corroding, 10.90; St. Louis, New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 24 lb, $11 per lb deld.; 24-90 lb, $9.50; 100-499 lb, $9.25; 450 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex. 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, N. York, $208-210 per 75 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-8.5 in. diam., 50-4999 lb, $8.15-11.50 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, briquettes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, in kegs, 74.50; "F" nickel, 5 lb ingots, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01; Exton, Pa., basis, add 1.60. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports or entry, contained nickel, 69.60.

Osmium: $70-90 per troy oz nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $137-140 per troy oz.

Ruthenium: $55-60 per troy oz.

Selenium: $6.50-7 per lb, commercial grade.

Silver: Open market, 91.375 per troy oz.

Sodium: Solid pack, c.l., 19.50; l.c.l., 20.00; brick, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.

Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom; sheet, $55 per lb nom.

Tellurium: $3.50-5 per lb, 100 lb or more.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot, 101.00; prompt, 100.50.

Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max.), $1.60 per lb; grade A-2 (0.5% Fe max), $1.50 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 100-lb lots, $2.75-2.85 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00c; 99+% hydrogen reduced, $3.10-4.00.

Zinc: Prime western, 12.00; brass special, 12.25; intermediate, 12.50, East St. Louis, freight allowed over 0.50 per lb. New York basis, add 0.50. High grade, 13.35; special high grade, 13.50 deld. Die casting alloy ingot No. 3, 15.00; No. 2, 15.50; No. 5, 15.25 deld. (All prices are nominal.)

Zirconium: Reactor grade sponge, 100 lb or less, $8.8.50 per lb; 100-500 lb, $7.25-7.50 per lb, 500-1000 lb, $6.50-7.25; over 1000 lb, $6.50 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 25.00-26.00; No. 12 foundry alloy (No. 2 grade), 22.75; 5% silicon alloy, 0.60 Cu max., 24.00; 13 alloy, 0.60 Cu max., 24.00; 195 alloy, 25.75; 108 alloy, 23.25. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 23.75; grade 2, 22.50; grade 3, 21.50; grade 4, 21.00.

Brass Ingot: Red brass, No. 115, 28.25; tin bronze, No. 225, 38.00; No. 245, 32.50; high-leaded tin bronze, No. 305, 32.75; No. 1 yellow, No. 405, 23.50; manganese bronze, No. 421, 27.50.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.945, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.945, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 35.35; l.c.l., 35.98. Weatherproof, 20,000-lb lots, 36.30; l.c.l., 37.05.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $16.50 per cwt; pipe, full coils, $16.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $6.75-15.50; sheared mill plate, $5.25-9.00; wire, $5.55-9.50; forging billets, $3.20-4.75; hot-rolled and forged bars, $3.80-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $14.00-25.00; H.R. strip, $14.00-22.90; C.R. strip, $16.00-35.00; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	138	120	138
Strip, C.R.	124	108	138
Plate, H.R.	130	110	126
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
0.250-0.136	24-72	72-180	45.40-48.00
0.136-0.096	24-72	72-180	45.90-48.80
0.096-0.077	24-72	72-180	46.40-50.30
0.077-0.068	24-72	72-180	46.90-52.10
0.068-0.061	24-72	72-180	46.90-55.00
0.061-0.048	24-72	72-180	47.40-57.70
0.048-0.038	24-72	72-180	47.90-60.50
0.038-0.030	24-72	72-180	48.40-63.30
0.030-0.024	24-72	72-180	48.90-67.20
0.024-0.019	24-60	72-180	49.40-59.90
0.019-0.017	24-48	72-144	50.30-57.00
0.017-0.015	24-48	72-144	51.20-58.00
0.015-0.014	24-36	72-144	52.30
0.014-0.012	24-36	72-144	53.50
0.012-0.011	24-36	72-144	54.60
0.011-0.0095	24-48	72-144	56.20
0.0095-0.0085	24-36	72-96	57.50
0.0085-0.0075	24-36	72-96	59.20
0.0075-0.007	24-36	72-96	60.80
0.007-0.006	24-36	72-96	62.50

ALUMINUM (continued)

Plates and circles: Thickness, 0.25-3 in.; width or diam., 24-60 in.; lengths, 72-240 in., mill finish.

Alloy	Plate Base	Circle Base
1100, 3003-F	44.60	50.90
5050-F	45.70	50.50
3004-F	46.70	52.40
5052-F	47.30	53.10
6061-T6	47.80	53.90
2024-T4*	51.80	58.90
7075-T6*	60.50	67.90

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 base, 12 ft lengths

Diam	Round		Hexagonal	
(in.)*	2011-T3	2017-T4	2011-T3	2017-T4
0.125	74.90	77.30	....	....
0.188	63.20	63.20	....	80.10
0.250	60.00	62.60	72.70	74.10
0.375	59.20	63.80	71.00	72.00
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	59.20	63.80	71.00	72.00
0.625	59.20	63.80	67.80	67.90
0.750	57.70	62.00	61.60	63.80
0.875	57.70	62.00	61.60	63.80
1.000	57.70	62.00	61.60	63.80
1.125	55.30	59.50	59.50	61.50
1.250	55.30	59.50	59.50	61.50
1.375	55.30	59.50	59.50	61.50
1.500	55.30	59.50	59.50	61.50
1.625	53.00	56.70	....	59.30
1.750	53.00	56.70	58.30	59.30
1.875	53.00	56.70	....	59.30
2.000	53.00	56.70	58.30	59.30
2.250	51.50	55.00	....	59.30
2.500	51.50	55.00	....	59.30
2.750	49.90	53.20	....	59.30
3.000	49.00	53.20	....	59.30
3.250	....	53.20	....	....
3.375	....	53.20	....	....

*Selected sizes.

Forging Stock: Round, Class 1, random length, diam., 0.375-8 in., "F" temper; 2014, 47.50-57.60; 6061, 43.50-57.60; 7075, 61.80-71.90; 7079, 66.80-76.90.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 32.00; 1¼ in., 43.40; 1½ in., 51.80; 2 in., 62.60; 3 in., 124.95; 4 in., 171.80; 5 in., 233.15; 6 in., 308.55; 8 in., 464.35; 10 in., 716.25 (3-24 ft lengths).

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	45.30-46.80	54.00-60.00
15-17	45.30-46.80	56.50-61.80
18-23	45.80-47.50	58.60-67.60
24-32	45.80-47.50	66.80-81.50
33-38	49.50-52.20	85.10-96.60
39-44	59.80-63.60	102.00-124.00

MAGNESIUM

Sheets and Plates: AZ31B standard grade, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24.72 in. widths; .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grade (AZ31B)
6-8	65.30-67.60	84.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 22.00-22.50; No. 2 heavy copper and wire, 20.00-20.50; light copper, 17.25-17.75; No. 1 composition red brass, 18.00-18.50; No. 1

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES e (Based on copper at 30.00c)		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes	Clean Heavy	Rod Ends	Clean Turnings
Copper	55.13b	52.36c	....	56.32	26.000	26.000	25.250
Yellow Brass	49.27	34.88d	49.56	53.43	20.375	19.625	18.625
Low Brass, 80%	51.75	51.69	52.04	55.81	22.500	22.250	21.750
Red Brass, 85%	52.62	52.56	52.91	56.68	23.250	23.000	22.500
Com. Bronze, 90%	54.03	53.97	54.32	57.84	24.000	23.750	23.250
Manganese Bronze	57.77-57.82	51.42-51.46	61.69	....	19.250	19.000	18.375
Muntz Metal	52.14	47.45	....	....	19.475	19.125	18.625
Naval Brass	54.08	47.89	60.39	58.24	19.125	18.875	18.375
Silicon Bronze	60.45-60.48	59.64-59.67	59.74-59.77	78.89	25.500	25.250	24.500
Nickel Silver, 10%	64.68	67.01	66.76	....	25.125	24.875	12.562
Phos. Bronze, A-5%	75.70	76.20	75.45	77.63	27.125	26.875	25.875

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time of any or all kinds of scrap, add 1 cent per lb.

composition turnings, 17.00-17.50; new brass clippings, 15.00-15.50; light brass, 12.00-12.50; heavy yellow brass, 13.00-13.50; new brass rod ends, 14.00-14.50; auto radiators, unsweated, 13.25-13.75; cocks and faucets, 14.75-15.25; brass pipe, 15.00-15.50.

Lead: Soft scrap lead, 7.25-7.75; battery plates, 2.25; linotype and stereotype, 8.00-8.50; electrotype, 7.00-7.25; mixed babbitt, 9.00-9.50.

Monel: Clippings, 23.00-24.00; old sheets, 22.00-23.00; turnings, 16.50-17.50; rods, 22.00-23.00.

Nickel: Sheets and clips, 50.00-51.00; rolled anodes, 50.00-51.00; turnings, 39.00-41.00; rod ends, 50.00-51.00.

Zinc: Old zinc, 2.50-3.00; new diecast scrap, 3.75-4.00; old diecast scrap, 2.25-2.75.

Aluminum: Old castings and sheets, 9.00-9.50; clean borings and turnings, 4.50-5.00; segregated low copper clips, 11.00-11.50; segregated high copper clips, 10.00-10.50; mixed low copper clips, 10.50-11.00; mixed high copper clips, 10.00-10.50.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 10.00-10.50; clean borings and turnings, 7.00-7.50; segregated low copper clips, 15.00-15.50; segregated high copper clips, 13.50-14.00; mixed low copper clips, 12.50-13.00; mixed high copper clips, 12.00-12.50.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 10.00; clean borings and turnings, 8.50; segregated low copper clips, 14.00; segregated high copper clips, 13.00; mixed low copper clips, 13.00; mixed high copper clips, 12.50.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)
Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 56.00; light scrap, 51.00; turnings and borings, 36.00.

Copper and Brass: No. 1 heavy copper and wire, 24.50; No. 2 heavy copper and wire, 23.00; light copper, 20.75; refinery brass (60% copper) dry copper content, 21.00.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 24.50; No. 2 heavy copper and wire, 23.00; light copper, 20.75; No. 1 composition borings, 19.25-21.25; No. 1 composition solids, 20.25-21.75; heavy yellow brass solids, 15.50-17.00; yellow brass turnings, 14.50-16.00; radiators, 16.00-17.00.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.60.
Copper: Flat-rolled, 47.04; oval, 43.50, 5000-10,000 lb; electrodeposited, 39.00, 2000-5000 lb lots; cast, 41.50, 5000-10,000 lb quantities.
Nickel: Depolarized, less than 100 lb, 114.25; 100-499 lb, 112.00; 500-4999 lb, 107.50; 5000-29,999 lb, 105.25; 30,000 lb, 103.00. Carbonized, deduct 3 cents a lb.
Tin: Bar or slab, less than 200 lb, 119.50; 200-499 lb, 118.C0; 500-999 lb, 117.50; 1000 lb or more, 117.00.
Zinc: Balls, 19.25; flat tops, 19.25; flats, 22.00; ovals, 21.25, ton lots.

CHEMICALS

Cadmium Oxide: $1.60 per lb in 100-lb drums.
Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,-000 lb or more, 29.50.
Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.
Copper Sulphate: 100-1900 lb, 15.25; 2000-5900 lb, 13.25; 6000-11,900 lb, 13.00; 12,000-22,900 lb, 12.75; 23,000 lb or more, 12.25.
Nickel-Chloride: 100 lb, 45.00; 200 lb, 43.00; 300 lb, 42.00; 400-4900 lb, 40.00; 5000-9900 lb, 38.00; 10,000 lb or more, 37.00.
Nickel Sulphate: 5000-22,999 lb, 29.00; 23,000-39,900 lb, 28.50; 40,000 lb or more, 28.00.
Sodium Cyanide (Cyanobrik): 200 lb, 23.80; 400-800 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.
Sodium Stannate: Less than 100 lb, 79.10; 100-600 lb, 69.70; 700-1900 lb, 67.00; 2000-9900 lb, 65.10; 10,000 lb or more, 63.80.
Stannous Chloride (Anhydrous): 25 lb, 154.40; 100 lb, 149.50; 400 lb, 147.10; 800-19,900 lb, 106.20; 20,000 lb or more, 100.10.
Stannous Sulphate: Less than 50 lb, 139.60; 50 lb, 109.60; 100-1900 lb, 107.60; 2000 lb or more, 105.60.
Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from Page 107*)

consumer level, however, but the mills are taking all they can get at their posted prices. An upward price movement is expected soon, with the market outlook the most promising it has been in months.

● **Birmingham**—While prices are unchanged, dealers and brokers anticipate a pickup in demand (notably the heavier grades) this month. Pipe shops in the area are expected to step up production shortly. In addition, the steel mills are thought likely to resume buying for inventory.

● **Los Angeles**—Dealers are anticipating strong demand during the first quarter; their optimism stems largely from good export prospects.

● **Seattle**—Prices are unchanged, but new schedules are expected shortly. Dealers look for improved export demand and more active mill buying in the weeks ahead. With the tax period past, buyers are more inclined to build up their inventories.

● **San Francisco**—The market continues to be steady but dull. One bright spot in the outlook is provided by exports, which continue strong.

Farm Equipment Demand Expected to Improve

Steadily rising demand for farm equipment and other durable goods is predicted by William J. Grede, president, J. I. Case Co., Racine, Wis. He bases his outlook on the reaction of Case dealers at the company's Hawaiian World Premiere and the trend of public buying predicted by most economists.

Referring to the Case Co.'s prospects for 1961, Mr. Grede also pointed to his firm's success in clearing dealer inventories. He doesn't look for a boom but anticipates steady demand this spring and summer.

Pig Iron . . .

Pig Iron Prices, Page 103

Pig iron sellers anticipate marked improvement in demand this month over the slow rate in the last few weeks of 1960. Foundries deferred

CLASSIFIED

WANTED
One #1 Late Model Buffalo or similar make Angle Roll with assorted attachments. Write or call
SAUDER TANK CO., INC.
220 Weaver St. Emporia, Kansas
Phone DI 2-2550
Robert A. Sauder, Vice President

Help Wanted

ENGINEERS DESIGNERS
McKee offers permanent career opportunities to individuals qualified by experience to undertake the design of:

Steel Plants	Refineries
Sintering Plants	Chemical Plants
Pelletizing plants	Petro-Chem Plants

Remuneration commensurate with experience and ability.
Reply in confidence to:
G. VICTOR HOPKINS
ARTHUR G. McKEE & COMPANY
2300 Chester Ave. • Cleveland 1, O.

SALES ENGINEER
Should have Electrical or Mechanical Engineering degree. Technical sales experience desirable. Send resume to **Leon H. Becker, Howell Instruments, Inc., 3479 West Vickery Blvd., Fort Worth 7, Texas.**

DEFENSE COMPANY NEEDS
Top man to set up and run new Forging Dept., making all type plumbing fittings—Steel, Stainless, Brass etc. Must be able to lay out plant and recommend correct Presses, also Hammers to buy. Send resume of experience to Bill Martin.
C & E FORGING CORPORATION
1710 W. Florence Ave., Inglewood, Calif.

Help Wanted

METALLURGIST: Minimum five years' experience Atmosphere Control Furnace Operations in either wire, rods or bars in carbon and alloy grades. Must be thoroughly experienced to take complete charge of laboratory and furnace operations. Position is of the highest importance and offers permanent stability with a prominent cold finished bar mill located in the East. Please do not apply unless fully qualified in every respect and furnish complete resume which will be held strictly confidential. Write Box 894, STEEL, Penton Bldg., Cleveland 13, Ohio.

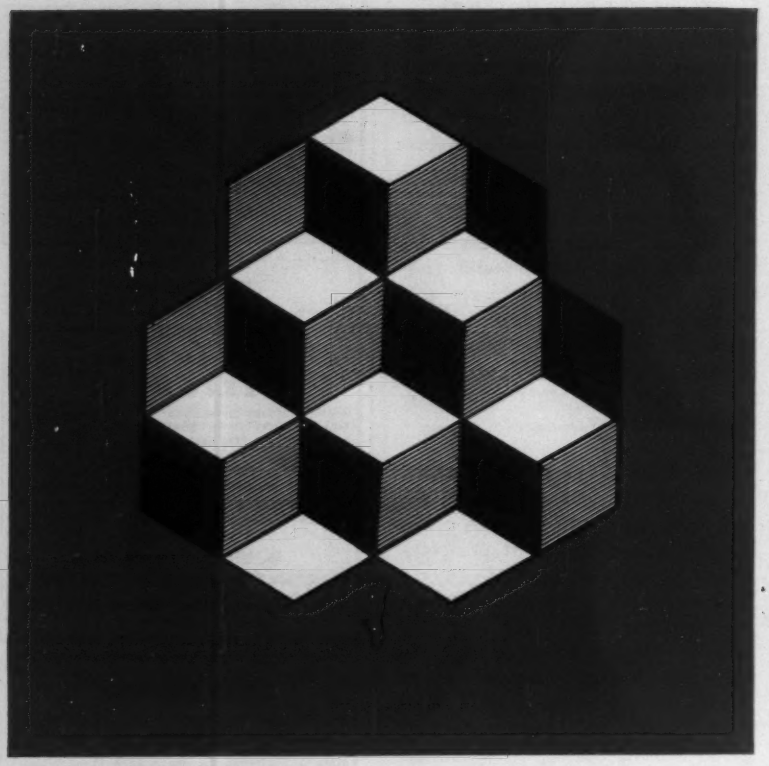
SALESMAN TO COVER CHICAGO TERRITORY selling mill and heavy industrial overhead traveling cranes. Respond to Box 893, STEEL, Penton Bldg., Cleveland 13, Ohio.

WANTED: COLD ROLLED STRIP STEEL SALESMAN for Michigan territory. Replies confidential. Write Box No. 895, STEEL, Penton Bldg., Cleveland 13, Ohio.

TOP-NOTCH STEEL SALESMAN
Must have experience in contacting and successfully selling steel products to implement manufacturers and steel fabricators, etc. Give full particulars in first letter. Box No. 896, STEEL, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

AVAILABLE—27 years Purchasing experience—20 of these in steel, handling total plant needs, raw materials, rolls, maintenance and fabrication. Some early experience in auditing and accounting. Now in Pittsburgh, willing to relocate. Reply Box 897, STEEL, Penton Bldg., Cleveland 13, Ohio.



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Write today for this new handbook of blast cleaning abrasive performance. It's full of charts and facts you can use to help cut abrasive consumption, reduce cleaning costs. Write to Wheelabrator Corp., 509 S. Byrkit St., Mishawaka, Ind. In Canada, P. O. Box 409, Scarborough, Ont.

WHEELABRATOR
STEEL ABRASIVES

purchases as much as possible to keep yearend inventories low for tax purposes. Tonnages entering consuming channels were also small.

Operators of blast furnaces are keeping production at correspondingly low levels. In the Buffalo district, for instance, Tonawanda Iron Div., American Radiator & Standard Sanitary Corp., shut down its single blast furnace at yearend for inventory adjustment. It is not expected to resume operations for about two months. Hanna Furnace Corp. continues to operate two of its four blast furnaces at its Susquehanna Furnaces, Buffalo.

Structural Shapes . . .

Structural Shape Prices, Page 98

Structural fabricating shops are entering the new year with a fair volume of orders on hand, but backlogs are unevenly distributed. Bridge and highway estimating is expected to pick up shortly, and urban renewal programs are coming out in heavier volume.

Steel for most of this work is scheduled for fabrication and erection by midyear, and this tonnage should be in the shops within the next few weeks.

Wide flange structurals for private construction work are in steady demand. Some fabricators are taking advantage of short leadtime on mill shipments of plain material to order steel only as new jobs are received.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

4381 tons, superstructure, Washington channel bridge, Washington, D. C., to Ingalls Iron Works, Birmingham; Blount Bros. Construction Co., Montgomery, Ala., general contractor.

3000 tons, bridge, Louisville-Lexington, Ky., Project 1-64-2(15)1, Jefferson County, Kentucky, to American Bridge Div., U. S. Steel Corp., Pittsburgh; Ruby Construction Co., Madisonville, Ky., general contractor.

2860 tons, office building, New England Life Insurance Co., Boston, to A. O. Wilson Structural Co., Cambridge, Mass.

1800 tons, 18 story bank and office building, El Paso National Bank, El Paso, Tex., to Mosher Steel Co., Lubbock, Tex., (structurals) and Southwest Steel Products Co., Houston (reinforcing bars); Robert M. McKee, El Paso, general contractor.

1120 tons, undersea research building, U. S. Navy Sound Laboratory, Ft. Trumbull, New London, Conn., to Bethlehem Steel Co., Bethlehem, Pa.; Pmty & Fuhrman Inc., New York, general contractor.

REINFORCING BARS . . .

REINFORCING BARS PLACED

3000 tons, post office, General Services Administration, Houston, to Capital Steel & Iron Co., Houston; Leavell Investment Co., El Paso, Tex., general contractor.

1440 tons, Seattle's 12 story city hall and municipal garage, to Pacific Coast Div., Bethlehem Steel Co., Seattle; Patti-MacDonald Construction Co. and Milbur Inc., Seattle, joint low bidders at $4,856,878.

1200 tons, federal office building, General Services Administration, Toledo, Ohio, to Pollak Steel Co., Cincinnati; F. D. Rich Co., Stamford, Conn., contractor.

1000 tons, bridge, Louisville-Lexington project 1-64-2(15)1, Jefferson County, Kentucky, to Southern Steel Products, Atlanta; Ruby Construction Co., Madisonville, Ky., general contractor.

524 tons, Washington channel bridge, Washington, D. C., to Southern Steel Products, Atlanta; Blount Bros. Construction Co., Montgomery, Ala., general contractor.

500 tons plus, reactor project, Hanford Works; Cleveland Consolidated Mechanical Div., Cleveland Electric Co., South Jacksonville, Fla., low at $7,686,000 to Kaiser Engineers, prime contractor, Richland, Wash.

500 tons, instrument laboratory center, Greenbelt (Md.) Air Base, Norair Engineering Corp., Washington, low on the general contract.

350 tons, chemistry-physics building, University of Kentucky, Lexington, Ky., to Southern Steel Products, Atlanta, Ga.; Whittenberg Construction Co., Louisville, general contractor; also required, 80 tons of structural steel placed with Whalen Erection Co., Louisville.

305 tons, state bridgework, RC60-190, Wayne County, New York, Bero Construction Co., Buffalo, low on the general contract.

300 tons, Natural History Building, Smithsonian Institution, Washington, George Hyman Construction Co., Washington, low on the general contract.

160 tons, repairs and widening of bridge, Portland, Maine; Ellis C. Snodgrass Inc., Portland, general contractor.

120 tons, bridge and connecting ramps over Jones Falls Expressway, Baltimore, to Bethlehem Steel Co., Bethlehem, Pa.; McLean Construction Co., Baltimore, general contractor.

REINFORCING BARS PENDING

4700 tons, also 2750 tons of shapes (gates, hoists, etc.) and 1350 tons penstocks and tunnel plates, Yellowtail Dam and powerplant, Big Horn River, Montana, Missouri Basin project; Bureau of Reclamation plans March bid call.

2130 tons, also 50 tons of shapes and unstated tonnage of steel piling, Washington State, four, box girder, highway structures, King County; bids to Olympia, Wash., Jan. 10.

1154 tons, eight state highway structures and reinforced concrete highway, interstate Route 91; bids Jan. 3; also required, 570 tons of mat reinforcement.

865 tons, also gates, hoists, etc., Trinity River, Lewiston Dam, California; Gibbons & Reed Inc., Salt Lake City, Utah, low at $3,410,632. Low bid is 21.5 per cent above estimates.

PLATES . . .

PLATES PLACED

1402 tons, high tensile alloy, Grade Hy-80, Portsmouth (N. H.) Navy Yard, to Lukens Steel Co., Coatesville, Pa.

900 tons, 3 million gallon watertank, City of Portland; to Chicago Bridge & Iron Co., Seattle, low at $450,850.

496 tons, Portsmouth (N. H.) Navy Yard, to Lukens Steel Co., Coatesville, Pa. (227 tons high tensile); Phoenix Steel Co., Claymont, Del. (278 tons, high tensile), and U. S. Steel Corp., Boston (91 tons, Hy-80, high tensile).

268 tons, high tensile, Navy General Stores Supply Office, Philadelphia, to U. S. Steel Corp., Pittsburgh.

150 tons, elevated tank, Andrews AFB, Maryland, to Chicago Bridge & Iron Co., Chicago.

PLATES PENDING

1725 tons, Grade M, Brooklyn Navy Yard, Brooklyn, N. Y.; bids to the Navy Purchasing Office, Washington, Jan. 10; also, 135 tons of high tensile plates are required.

105 tons, stainless, finish No. 1, Navy General Stores Supply Office, Philadelphia; bids Dec. 28.

105 tons, 52 in. inside diameter steel pontoons, 87 each; U. S. Engineer, Philadelphia.

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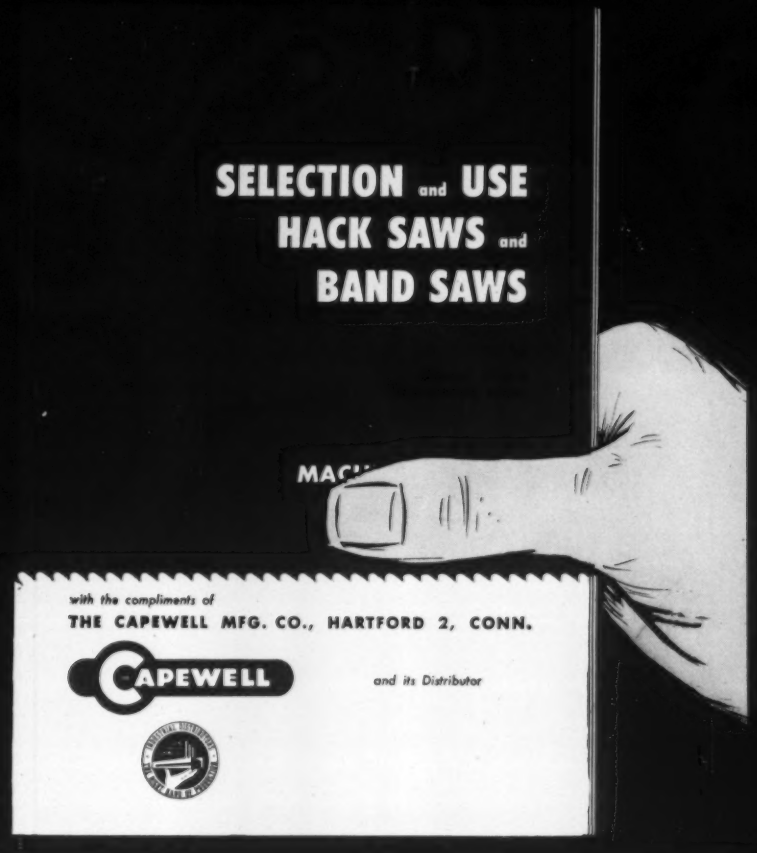

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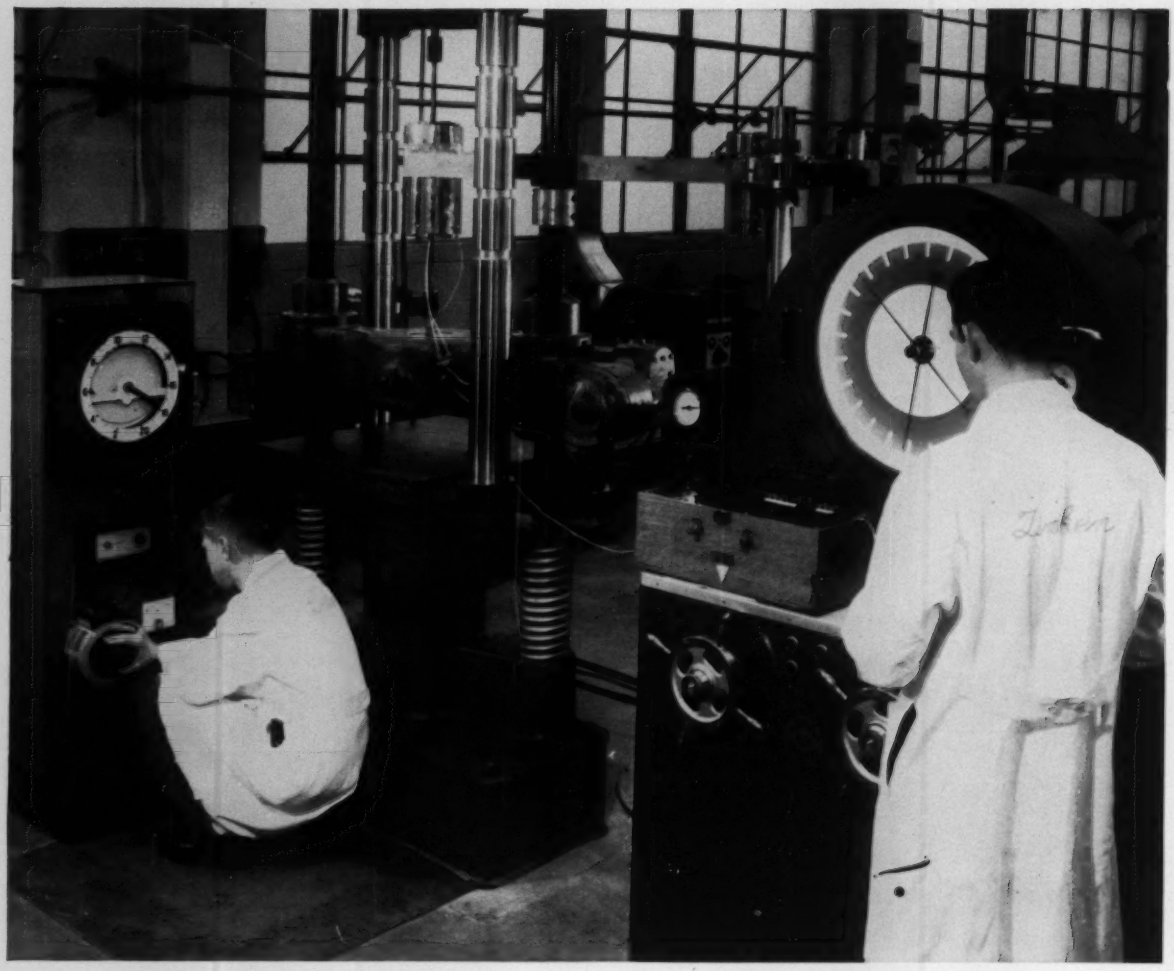

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